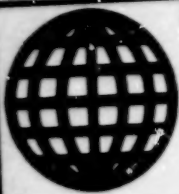


JPRS-TND-89-001
13 JANUARY 1989



FOREIGN
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JPRS Report

Nuclear Developments

Nuclear Developments

JPRS-TND-89-001

CONTENTS

13 JANUARY 1989

CANADA

- Institute Urges Study of Hanford Effects in Canada [WINDSOR STAR 3 Nov 88] 1

CHINA

- Gobi Desert Slated for Nuclear Waste Disposal [ZHONGGUO XINWEN SHE] 2
 First Large Nuclear Power Turbine Built [XINHUA] 2
 Nuclear Industry 'Advancing With Difficulty' [ZHONGGUO XINWEN SHE] 2
 Zhao, Li, Other Leaders at Nuclear Conference [XINHUA] 3
 Hainan Power Crisis May Cause Switch to Nuclear Power [HONGKONG STANDARD 14 Nov] 4

LATIN AMERICA

BRAZIL

- Angra I May Be Shut Down for Safety Reasons [O ESTADO DE SAO PAULO 25 Nov] 5
 IPEN Reactor Inaugurated in Sao Paulo [O ESTADO DE SAO PAULO 29 Nov] 5
 Nuclear Program Delays New IBRD Funds [O ESTADO DE SAO PAULO 30 Nov] 6

NEAR EAST & SOUTH ASIA

EGYPT

- Officials on Nuclear Energy Program [MENA] 7

INDIA

- Analyst Questions Purchase of Soviet Reactors [JANSATTA 13 Oct] 7
 Safeguards Accord With IAEA Clears Way for Soviet Reactor [THE HINDU 19 Oct] 8
 USSR To Supply Enriched Uranium for Proposed Nuclear Reactors [THE HINDU 30 Oct] 9
 Importing of Nuclear Material From FRG Denied [Delhi Radio] 10
 Ambitious Plan To Step Up Nuclear Fuel Output [PATRIOT 24 Oct] 10
 India's 1st Heavy Ion Accelerator Becomes Fully Operational [THE HINDU 7 Nov] 11
 MAPS Unit To Start Soon [THE TIMES OF INDIA 17 Nov] 11
 Narora Atomic Power Unit To Start 'This Month' [Delhi Radio] 12
 6 More Nuclear Reactors Proposed [THE HINDU 18 Nov] 12
 Papers Report on Safety of Nuclear Power Plants 13
 AEC Chief on Tarapur [THE TELEGRAPH 24 Oct] 13
 More on Tarapur, Other Plants [THE TIMES OF INDIA 25 Oct] 13
 New Narora Station Safe [THE TIMES OF INDIA 10 Nov] 13
 Details on Safety Precautions [THE HINDU 28 Oct] 14
 Tamil Nadu Nuclear Power Plant Dubbed 'Time Bomb' [THE TIMES OF INDIA 1 Nov] 17
 Light-Water Leak Reported at Nuclear Power Plant [Delhi Radio] 18
 Test of New Surface-to-Surface Missile Planned [AFP] 18

SOVIET UNION

- Officials Cited on Armenian AES Safety [KOMSOMOLSKAYA PRAVDA 24 Dec] 20
 Cutbacks in Nuclear Power Plants in Quake Zones [ARGUMENTY I FAKTY 6-12 Jan] 20
 'Leading' Scientist on Chernobyl Study Progress [TASS] 20
 Capacity of Nuclear Power Station To Triple [Hamburg DPA] 21
 Tokamak-15 Thermonuclear Unit Starts Up [IZVESTIYA 30 Dec] 21
 Nuclear Power Plants for Space Vehicles Developed [TASS] 22
 Ignalina Reactor's Future Discussed, Opposed [Vilnius International] 23
 Gosatom Official on Nuclear Waste Disposal [LITERATURNAYA GAZETA 28 Dec] 23

WEST EUROPE

FEDERAL REPUBLIC OF GERMANY

Illegal Export of Nuclear Equipment Facilities [Cologne Radio]	25
Confessions of Illegal Export of Nuclear Facilities [WELT AM SONNTAG 25 Dec]	25
Agreement Signed With PRC on Nuclear Technology [DPA]	26
Stricter Export Controls Planned [DIE WELT 28 Dec]	26
SPD Demands Halt to Nuclear Exports [DIE WELT 29 Dec]	27

IRELAND

Meeting Told of Problems in Nuclear Waste Disposal [IRISH INDEPENDENT 22 Oct]	28
---	----

SWEDEEN

Majority Favoring Nuclear Energy Unchanged [DAGENS NYHETER 14 Dec]	28
--	----

UNITED KINGDOM

Correspondent on Future of Nuclear Energy [THE DAILY TELEGRAPH 1 Nov]	28
UK Seeks To Replace Military Nuclear Reactors [THE DAILY TELEGRAPH 9 Nov]	29
Transport Union Set To Blacklist Nuclear Cargo [THE SUNDAY TELEGRAPH 20 Nov]	29

Institute Urges Study of Hanford Effects in Canada

51200009 Windsor THE WINDSOR STAR in English
3 Nov 88 p A12

[Excerpts] Vancouver (CP)—It may take another five years before Washington state residents discover the effects of radiation releases in the 1940s and 1950s from the Hanford nuclear power plant.

Canadians, however, may never discover what effects the emissions may have had north of the border.

U.S. officials have launched a \$15-million study into the emissions from Hanford, located 300 km south of British Columbia. But the laboratory conducting the test says it doesn't plan to extend the testing into Canada.

At least one public health watchdog group says that is a mistake.

Rosalie Bertell, president of the International Institute of Concern for Public Health, said residents of southern British Columbia and Alberta may have been victims of massive radioactive releases from the Hanford nuclear reservation.

Some of the radiation, Hanford officials conceded, was the result of deliberate leaks to test impact on the environment from the nine reactors then operating.

Some was uncontrolled radiation leaking from buried tanks containing nuclear waste, which remains at the site. Only one reactor is now operating.

The Institute, based in Toronto with offices in Buffalo, Scotland and Malaysia, works with communities that suspect local health problems are the result of environmental pollution.

"There was certainly a downwind problem into B.C. and possibly Alberta, but any downstream problem would have been via the Columbia river to Vancouver," she said from Toronto.

Bertell also said the Canadian government should follow the example of U.S. authorities in researching the long-term effects of the radiation releases.

Dave Morley of the B.C. Radiation Protection Branch said federal and provincial agencies monitor air and water quality and look for contamination in foodstuffs such as milk.

Morely said radiation levels were monitored in the late 1950s, but couldn't say if any health impact studies were conducted at the same time.

Bertell said documents show that in 1959 Hanford was releasing Iodine-131 with an average radiation level of 10 curies every day. oB - "Now the entire release at the Three Mile Island disaster was 15 curies," Bertell said, referring to the near melt-down at the Pennsylvania nuclear plant in 1979.

Gobi Desert Slated for Nuclear Waste Disposal
HK0812111388 Beijing ZHONGGUO XINWEN SHE
in Chinese 0850 GMT 7 Dec 88

[Report by Zhu Huiyi: "China Will Build a Nuclear Waste Disposing Base in the Northwest"—ZHONGGUO XINWEN SHE headline]

[Text] Lanzhou, 7 Dec (ZHONGGUO XINWEN SHE)—A pilot plant for the aftertreatment of component parts of a nuclear power reactor with a total construction area of 20,000 square meters and involving a total investment of more than 200 million yuan will be built in the immense Gobi Desert along the Silk Road.

According to authentic sources, this signifies preparation for a plan to build a large-sized reactor waste treatment base in northwestern China.

China has just made a start in the development of its nuclear power industry. Its initial target in this field is an installed nuclear power capacity of 10 million kilowatts by the turn of the century. The Qinshan and Daya Bay nuclear power plant projects that are now under construction are expected to be put into operation in the 1990's. By that time the aftertreatment of nuclear waste produced by the pressurized-water reactors of the nuclear power plants will turn out to be one of the key factors in safety operation.

Some nuclear experts noted that the Gobi Desert, where the nuclear waste disposal base is to be built, is far from densely populated areas, and no residents except staff members of the base will live within a distance of several tens of kilometers from the base. Radioactive materials can hardly be amassed here as the base is located at the wind gap of the desert, where the wind speed can be as high as 17 meters per second. What is more, the annual evapotranspiration is more than 400 times as much as the annual rainfall here, and convenient transport facilities and ample supply of electric power will be available. All these factors make the place a particularly suitable location for a nuclear waste aftertreatment base.

It is said that the fuel elements removed from nuclear power reactors will first be stored within the plants and then be transported to the base in containers built up to the safety standards set by the International Atomic Energy Agency. The fuel elements will then be reprocessed to extract useful elements such as uranium and plutonium. Finally, the reprocessed waste will be solidified, packed, and buried underground.

Mr Zhang Tianxiang, a nuclear expert who is directly involved in the design of the pilot plant, told this reporter: "This place, as one of China's nuclear weapon producing bases, has satisfactorily disposed of a great deal of nuclear residues, up to the world's advanced standards in all the major fields of reactor waste aftertreatment technology. Specialists from the FRG, Italy, and other countries visiting here appreciated our production conditions and administration performance."

The construction of the pilot plant is to be completed by 1995, and the construction of a larger aftertreatment plant will be started in 2000.

First Large Nuclear Power Turbine Built
HK1312003188 Beijing XINHUA Hong Kong Service
in Chinese 0918 GMT 10 Dec 88

[Report by reporter Zhang Gaopeng and correspondent Jiang Hongfa: "China's First Large Nuclear Power Turbine Built in Shanghai"]

[Text] Shanghai, 10 Dec [XINHUA]—The first 300,000-kilowatt nuclear power turbine designed and manufactured by China was manufactured at the Shanghai Turbine Factory and passed through the state-level acceptance test yesterday.

This installation will be installed at the Qinshan Nuclear Power Plant in Zhejiang. It is mainly composed of a high-pressure cylinder unit, a low-pressure cylinder unit, and a steam-water separator. During the manufacturing process, the technicians solved more than 40 key difficult problems and completed over 20 technological experiments and key technical projects, so as to guarantee that the installation can fulfill every target as originally designed.

It is reported that the lesson of the incident at the Soviet Chernobyl nuclear power plant was borrowed during the manufacturing process. They also perfected and improved the system guaranteeing the quality of the installation. Quality supervision was conducted during the whole process from design to manufacture in order to guarantee a high quality.

Nuclear Industry 'Advancing With Difficulty'
HK1412074388 Beijing ZHONGGUO XINWEN SHE
in Chinese 0326 GMT 12 Dec 88

[Roundup by Zhu Huiyi: "Despite the Difficulties Confronted by China's Nuclear Industry in Advancing Toward Peace, the Prospects Are Broad"—ZHONGGUO XINWEN SHE headline]

[Text] Beijing, 12 Dec (ZHONGGUO XINWEN SHE)—Since the beginning of the 1980's, China has substantially reduced the production of nuclear weapons, and the focus of its nuclear industry has shifted to the development of nuclear energy and the popularization of isotopic and nuclear technology, as well as the development of civilian products.

In heading toward peace over the past few years, China's nuclear industry has met with numerous difficulties. It is still advancing with difficulty.

A responsible person in charge of a nuclear weapons production base complained that, although his plant would become an important base supplying fuel to nuclear power stations and disposing of nuclear waste, it was still in the state of "waiting for the rice to cook" because the first batch of nuclear power stations would not go into operation until the 1990's. The fact that it is situated in the Gobi Desert and has slow access to information and long communications lines has resulted in the annual output value of its civilian products fluctuating at a low level.

Observers here hold: In the course of advancing from atom bombs to nuclear power stations, there have been periods when China's nuclear industry has been in neutral. To achieve self-independence, considerable forces will be needed to shift 300,000 workers in the nuclear industry to the production of civilian products. However, the common problems faced by this contingent of workers are the shortage of funds and resources, poor transport facilities, and the fact that most nuclear-polluted equipment cannot be used to manufacture civilian products.

The prospect for popularizing isotopic and nuclear technology can hardly be optimistic, either. Although its fine varieties of farm crops cultivated with nuclear radiation account for 43 percent of the world's radioactive breeding, China's radioactive-processing industry and production of isotopic instruments have not developed into mass production; the method of using isotopes to make diagnoses and give treatment has been applied in clinical practice in only one-fifth of large and medium-sized hospitals; the annual output value of radioactive medicine amounts to a mere 10 million yuan, and, of the 150-odd radiation centers in China, very few engage in commercial operations.

Tracing the matter to its source, a responsible person of China's Isotope Corp. said in criticism: The state does not have unified planning and perfect regulations on the production and application of isotopes, nor does it give support in terms of funds and equipment; the relevant departments place too many restrictions on the transport of isotopic products, and the deep-rooted "nuclear-terror mentality" among the masses has also restricted the popularization of nuclear technology.

However, an authoritative person in the nuclear industrial circles is still optimistic about the prospects for the peaceful use of atomic energy in China.

The central government has repeatedly affirmed that the development of nuclear power stations is an important way to resolve the problem of energy growth in the medium and long term. The second-phase project of Qinshan nuclear power plant has recently been approved. Plans are also being made for the construction of a nuclear power station in northeastern China. Construction of a large power-driven nuclear waste after-treatment base will start soon in northwestern China.

On the question of how to solve the problem of the funds needed for the development of nuclear power, some experts here suggest concentrating the state's limited energy funds and idle funds by issuing bonds and debentures and, at the same time, appropriately using low-interest international loans.

Introducing mature technology from abroad and forming joint ventures or cooperating with foreign countries will be an important path to isotopic production and popularizing nuclear technology. Talks are being held on importing a radioimmunotechnological project from Australia. China's Isotope Corp. has set up radioimmunoreagent diagnosing centers in Beijing, Tianjin, Shanghai, and Guangzhou, and will popularize them in other cities as well as in Hong Kong and Singapore.

In developing civilian products, the nuclear industrial enterprises have taken accelerated production of raw materials in short supply as a point of breakthrough. A production line with an annual production capacity of 15,000 tons of titanium white powder will soon be commissioned, and the construction of a chemical fertilizer plant with an annual output of 300,000 tons has started. In Jiangxi and Baotou, construction of large rare-earth production bases is under way.

Zhao, Li, Other Leaders at Nuclear Conference
HK1412110088 Beijing XINHUA Hong Kong Service
in Chinese 1130 GMT 13 Dec 88

[Report by Liu Huinian: "Party and State Leaders Meet Experts Attending Conference on Development of Nuclear Technology"—XINHUA headline]

[Text] Beijing, 13 Dec (XINHUA)—This morning party and state leaders Zhao Ziyang, Yang Shangkun, and Li Peng met in Beijing the 150 or so experts attending the Conference on the Development of Nuclear Technology and congratulated them on their achievements in the country's nuclear industry and technology.

Zhao Ziyang said: "China has quite a good team of scientists and technicians and an even better one in advanced scientific and technological research. This is a very valuable treasure as well as an important condition for our participation in the new global contest in aggregate national strength in the next century." He added: "In the next century, China should occupy the place in the world that it deserves. This requires our team of scientists and technicians and, in particular, the team involved in the development of advanced science and technology to make further efforts to strive for even greater success."

Yang Shangkun thanked all of them for their new achievements in scientific research. He called on them to continue to make unremitting efforts to make further achievements in science and technology, particularly in the field of advanced science and technology, in order to make China worthy of its international status.

Li Peng said: "The experts are working under harsh conditions. This is by no means easy. The State Council will give as much support to their work as possible."

Before the meeting the central leaders also heard reports presented by the experts on nuclear technology.

Hainan Power Crisis May Cause Switch to Nuclear Power

51400001 Hong Kong HONGKONG STANDARD in English 14 Nov 88 p 5

[First in a four-part series by Fan Cheuk-wan: "A Nuclear Future Flickers for Hard-Hit Hainan"]

[Text] Hainan Province, its power crisis temporarily solved by a massive investment in thermal power, may switch to nuclear energy after the year 2000.

Only upgraded to a province in April, Hainan has been plagued by serious power shortages since late 1986 as a result of a two-year drought.

The drought reduced water storages to less than 30 percent of its normal level, crippling the hydro-electric operation.

Mr Wang Shoushen, general manager of the Hainan Province Electric Power Company, said the Hainan government would invest four billion yuan (HK\$8.4 billion) in developing thermal power for the island's use up to 1992.

The company has also completed a long-term electricity development plan designed to satisfy the island's energy needs up to 1995.

"Last April, we jointly conducted a feasibility study on nuclear power development in Hainan with the Ministry of Nuclear Industry in a move to fight the power shortage," Mr Wang said.

"As Hainan does not have coal reserves and the transport cost for coal will be too expensive, we must develop nuclear power in the long run.

"But it will be too early for us to build a nuclear plant now as the cost is too high. We will consider plans to develop nuclear power after 2000 when the estimated power consumption will exceed three million kilowatt-hours."

Thermal power was the most effective short-term solution, Mr Wang said.

He said the provincial authorities had ordered the company to quicken construction of the Haikou Electrical Plant at Macun to solve the serious power shortage.

Hainan has a generating capacity of 385,000 kilowatt-hours, of which hydro-electric power contributes 252,000 kilowatt-hours and thermal power 133,000 kilowatt-hours.

The Haikou city administration has provided a rotating power supply since last February.

Factories were forced to stop production because of frequent breakdowns of electricity supply.

The current daily power consumption of Haikou, Hainan's largest city, is 70,000 kilowatt-hours and the power supply has reached 75,000 kilowatt-hours.

"The first stage of power development will be planned to meet Hainan's demands up to 1990, which will double the existing generating capacity of 300,000 kilowatt-hours," Mr Wang said.

"Building of the Macun plant started in November last year and the first thermal power generator with a capacity of 50,000 kilowatt-hours is now serving Haikou city.

"Another generator with the same capacity will start production by the end of this year."

Two other generators, each with a capacity of 125,000 kilowatt-hours, will also go into operation, one in July and the other in March 1990.

"The second stage of power development will increase the total capacity of 550,000 kilowatt-hours in 1990 to two million kilowatt-hours, which is expected to satisfy the needs until 1992," Mr Wang said.

Two major projects, the Yangpu Electrical Plant and the Daguangba Hydro-Electric Power Plant, will be built in the second stage of development.

In 1995, the power consumption was expected to reach three million kilowatt-hours, so further expansion of the existing thermal power supply was necessary, Mr Wang said.

BRAZIL

Angra I May Be Shut Down for Safety Reasons
51002039c Sao Paulo O ESTADO DE SAO PAULO in
Portuguese 25 Nov 88 p 13

[Text] It has been 2 years since the International Atomic Energy Agency, at the request of Furnas, inspected and observed defects in the safety system at the Angra I nuclear plant in the state of Rio, and most of its recommendations have yet to be acted on. This report was made by physicist Luis Pinguelli Rosa, a member of the commission set up by the Federal Justice to inspect the plant, in response to a petition by the Partido Verde (Green Party). The Justice Ministry may even suspend operations at Angra I, State Deputy Carlos Minc (PV-RJ) said yesterday.

Judge Maria Tereza de Almeida Lobo from the 7th Federal District in Rio stated that, based on the findings, she would order measures that could range from a change in some standards to a shutdown of the plant for a given period of time, Minc said. The initial report of one of the members of the commission, physicist Luis Pinguelli Rosa of the Federal University of Rio de Janeiro (UFRJ), was presented yesterday and contains 32 points of vital importance for safety; of these, 5 are not being observed and are regarded as serious infractions, 8 are considered as less serious or minor infractions, 8 conditional, and only 11 are being followed in accordance with the agency's specifications.

Next week another member of the commission, physicist Ancelmo Paschoa, will submit his conclusions. Two other experts are on this commission: one from the National Nuclear Energy Commission (CNEN) and one from Furnas. The independent inspection was conducted on the 18th, as a result of the petition presented in October 1986 by the Green Party. In Pinguelli's report, already forwarded to the judge, the five serious infractions stem from the fact that the security standards adopted are obsolete by international standards: There are no CNEN standards determining limits on radioactive effluent released outside the plant; the emergency plan has never been simulated; the local population has not been properly advised of what to do in the event of an accident; and finally, the safety system in the event of a disaster is inadequate.

"It is curious that the commission spoke of the need to train the people in the event of an accident. They told us that this would cause panic among the people. Imagine then what would happen if there were a real accident," Carlos Minc said ironically, in criticizing an emergency plan that exists only on paper.

Pinguelli also noted other areas of concern that were not part of the recommendations of the International Atomic Energy Agency. The disposal of radioactive waste is what most concerns physicists and ecologists and, at their next meeting with the judge, they are going

to ask for authorization to inspect other sites and check CNEN's data to determine how safety measures are being observed. They also want deadlines for compliance with safety standards, failing which Angra I would be shut down.

Other defects, in Pinguelli Rosa's view, include the following: a lack of displays in the operations room; unsatisfactory monitoring of the steam generator, which has manufacturing defects; and the lack of guard rails around the pool of radioactive waste. They are therefore going to ask for stepped-up monitoring of plutonium waste which can be used to make an atomic bomb, the physicist concluded.

IPEN Reactor Inaugurated in Sao Paulo
51002039a Sao Paulo O ESTADO DE SAO PAULO
in Portuguese 29 Nov 88 p 12

[Text] Next year the Ipero plant in Sao Paulo will begin producing fuel for the first Brazilian nuclear submarine to be launched at sea around 1995. This information was disclosed by the president of the Coordinating Agency for Special Naval Projects, Rear Admiral Othon Luiz Pinheiro da Silva, during the official inauguration of the first completely Brazilian nuclear energy reactor at the Institute for Energy and Nuclear Research (IPEN) on the University of Sao Paulo campus.

The reactor, which was largely financed by the Brazilian Navy, has been in operation for the past 3 weeks and is being used as a laboratory unit for Brazilian scientists. It produces only 100 watts of power, not even enough to light a bulb, and the nuclear reactor inside it is so weak that it barely produces heat. However, in its operations it perfectly imitates the dynamics of a large-scale reactor. Besides making it possible to study the sizing of a nuclear submarine engine, IPEN's reactor will be used for thermohydraulic circuit testing, which was also inaugurated yesterday, since it simulates the mechanical and thermal operations of a large-scale plant. "In a short time we will be able to master the entire process, both for producing power and for making our own nuclear submarines," said Navy Minister Henrique Saboia, who inaugurated the reactor together with Sao Paulo Governor Orestes Quercia. Construction of the reactor began in 1984 and cost \$9.2 million (5.3 billion).

Meanwhile, the speed at which Brazil's nuclear development program progresses depends on the Ministry of the Navy budget for the next year, which will be decided by the National Congress. The nuclear program and specifically development of the atomic energy-powered submarine, has been regarded as too costly by some members of Congress. Minister Saboia and experts from the agencies involved with the program have been in Brasilia trying to convince deputies and senators of the importance of performing their own research. "It is important to understand that Brazil needs to invest in technology," Minister Henrique Saboia said.

Nuclear Program Delays New IBRD Funds
51002039b Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Nov 88 p 27

[Article by Eleno Mendonca]

[Text] The transfer last August of nuclear plants to Eletrobras, besides blocking the transfer of World Bank (IBRD) resources needed for the recovery of the electrical sector, has also caused delays in possible financing of some of the 19 industrial projects in the country, according to a study begun in June by the Nakasone Fund. Involved in developing large-scale projects in developing countries, the Japanese Fund is not willing to engage in any operations with Brazil until the IBRD transfers the \$500 million credit line to Eletrobras, which was approved in June of last year. The Brazilian nuclear-electric experiment, however, which has not as yet generated a single kilowatt, is preventing the country from receiving new money on the international market at lower interest rates and on better payment terms.

"Foreign credit has in effect been held back and resources will not be made available until finalization of the operation with the IBRD, whose concerns are understandable," Jaime Rotstein, a member of the National Energy Commission (CNE), stated. Rotstein, who has been opposed to nuclear power plants ever since the agreement with Germany was signed in 1980, has suggested that coal and small waterfalls should be exploited before the country gets involved in atomic energy.

He does not believe that the IBRD will transfer the \$500 million for nuclear power plants, but would prefer to see Congress discuss whether or not these atomic projects designed to generate electricity should be pursued. "Nobody has the right to legislate the entire thing without asking the people if they want these plants," Rotstein argues. "In Austria, for example, a plant was recently prevented from starting operations because it was not approved in a plebiscite."

According to Professor Jacques Marcovitch of the USP [University of Sao Paulo], the government resolved the political problem by annexing the nuclear plants to Eletrobras, thereby dissolving Nuclebras and merging

the official nuclear program with the parallel one. However, he observes, a bankrupt company was incorporated into one in financial recovery. In his opinion, the nuclear projects should be operated as a subsidiary of Eletrobras, without any economic ties.

An Expensive Alternative

"We should rethink our entire energy plan, because it is not possible to invest simultaneously in offshore oil prospecting, in maintaining Proalcoal and its projects, in the natural gas program, in coal, and in building hydroelectric power plants in the North," he said. And he added: "Latin America needs to centralize its energy efforts, taking advantage of the unused Argentine watersheds, Bolivian gas, and Venezuelan oil." According to Marcovitch, in addition to providing a less costly solution for everyone, it would be consolidating the integration of an economic block capable of competing in the international marketplace.

According to USP Dean Jose Goldemberg, the IBRD wants the Angra III project to be abandoned. "This is certainly an expensive alternative. Budgeted between \$4 and 5 billion, Angra III's production is estimated at 1.3 million kilowatts. The same amount of hydroelectric power would cost no more than half that," Goldemberg assured us. In his opinion, the best thing to do at this stage would be to suspend construction of that plant so that the IBRD would release the \$500 million credit line.

Even with delays in the project timetable, Goldemberg does not believe that there is any danger of rationing of electricity by 1993. According to him, Eletrobras's plan for 2010 exaggerates the danger, and this is a form of pressure by contractors and the electrical sector on the government. In his view, energy conservation and more moderate consumption, achieved by rate increases that would force more rational use of energy, could reverse these expectations. "Moreover, incentives to use natural gas could also be a way of altering the energy profile."

Jaime Rotstein agrees with Goldemberg's views to the effect that the threat of rationing is not as imminent as some are saying. "Economic growth will obviously not progress at the rate estimated by Eletrobras. However, the need to invest in maintaining a modernized system of electricity should not be forgotten," Rotstein pointed out.

EGYPT

Officials on Nuclear Energy Program
NC0112162688 Cairo MENA in Arabic
1330 GMT 1 Dec 88

[Excerpts] Cairo, 1 Dec (MENA)—Dr 'Ali al-Sa'idi, chairman of the Nuclear Plant Authority, has announced that a feasibility study will be conducted on the establishment of sophisticated small and medium-sized nuclear reactors for electricity generation in Egypt. The components and parts required for these reactors will be supplied mostly by local manufacturers, he said.

Dr al-Sa'idi was speaking at a seminar on the future of nuclear energy, organized by Al-Zaqaziq University as part of the 11th annual conference on scientific research and applications.

Dr al-Sa'idi stated that an agreement has been reached with the IAEA to launch studies on the possibility of introducing these types of reactors, with emphasis on the local manufacture of most components. [passage omitted]

Dr al-Sa'idi stressed that the decision to build the first electricity-generating reactor must take several political considerations into account. These include the verification of the availability of nuclear safety requirements; access to data pertaining to nuclear energy; the existence of the appropriate legislation to protect man and the environment; safety measures; the availability of technical and scientific cadres who are capable of absorbing the required technology; the availability of foreign finance; and the approval of all state authorities, particularly in light of the Chernobyl incident. [passage omitted]

Dr Hamid Rushdi, chairman of the Atomic Energy Authority, asserted that the authority is fully aware of its responsibility concerning the transfer of nuclear technology and its adaptation to our needs. It is also very aware that the greatest attention must be paid to the question of safety and protection against nuclear radiation in handling isotopes and nuclear reactors, he said. His speech was delivered on his behalf by Dr Fawzi Hammad, director of the nuclear safety department.

Dr Rushdi noted that, in the past few years, Egypt had set out to develop a national base for nuclear manufacture. Examples of this are the local manufacture of nuclear fuel rods, heavy water, radioactive sources used in medical applications, radiometers, and radio detection equipment.

Dr Rushdi asserted that the Atomic Energy Authority is aware of its responsibility to dispose properly of nuclear waste. It is also aware of the extent of radiation-affected foodstuff stocks waiting for illegal disposal in certain countries, he added.

For his part, Dr Husayn 'Abd-al-Muhsin, head of the Nuclear Substances Authority, asserted that the use of nuclear energy in generating electricity requires the outlining of a national strategy for the local production of the nuclear fuel uranium. In this way, he said, Egypt will avoid falling under the pressure of international monopoly and the producer countries' monopoly of purchasing operations, and will also avoid becoming subservient to international political currents. [passage omitted]

INDIA

Analyst Questions Purchase of Soviet Reactors
51004701 New Delhi JANSATTA in Hindi
13 Oct 88 p 6

[Article by Subhash Sharma: "How Much Can We Progress With Soviet Reactors?"]

[Excerpts] At present we are planning to purchase two reactors, each at 1,000-megawatt capacity, from the Soviet Union. These units will use enriched uranium as do those of the Tarapur Reactors. The fuel for the reactors will also be supplied by the Soviets. Although it is not a new thing for a developed country to set up reactors in other countries, it is strange that on one hand self sufficiency is claimed in setting up reactors, on the other, the decision is being made to buy reactors from foreign countries. These two facts contradict each other. [passage omitted]

Now, if we look at the objectives set in the past for the production of nuclear electricity we will find that repeated cuts have been made. Currently our nuclear power plants have a total capacity of 1,230 megawatts (thermal) that is equivalent to a capacity of producing 1,154 megawatts of electricity. At present altogether six reactor units (two at Tarapur, two at Kota, and two at Kalpakkam) are producing electricity. The Tarapur reactor was established with the help of Canada for which fuel was supplied by the United States. This reactor also uses enriched uranium. At one time when the United States refused to supply nuclear fuel for the plant France took over the responsibility of supplying it. This reactor had started functioning in 1969. According to the present estimates it will continue to produce electricity only until 1992-93, thereafter, it will have to be closed down. The units at Kota and Kalpakkam have a capacity of respectively 220 and 235 megawatts (thermal) each. These units use natural uranium available in the country. Out of these six units presumably only four will be producing electricity by the turn of the century. At present it is expected that the two units of Narora reactor will start functioning within the seventh 5-year plan period. It means that by 1989 we will have six reactor units which will be producing electricity by the end of the century. The total capacity of these units to produce electricity will be 1410 megawatts (thermal). Then, will we be able to build nuclear power plants of the capacity of 8,590 megawatts during the period 1989-2000? [passage omitted]

On the other hand, after the Chernobyl accident many doubts are being raised in regard to Soviet reactors. First of all we will have to look at the safety plans for these reactors. During the sixties decade the Soviet scientists had said that for our climatic conditions either the WWER-type water reactor or RBM's channel type uranium graphite boiling water reactor would be most suitable for us. Consequently, it was decided to set up reactors on these models. The decision was made to set up 48 units of the first type reactors by 1990 with the total capacity of 48,903 megawatts. By 1983, a total of 27 reactors of this type were set up in Bulgaria, Czechoslovakia, Finland, East Germany, and Hungary with Soviet cooperation. The Soviet Union has been setting up units of Chernobyl-type reactors since 1954. These units are of RBM model and are in production at Leningrad (9,000 megawatts), Kursk (6,000 megawatts), and Chernobyl (6,000 megawatts). But, because of the accident that took place at unit-3 of the Chernobyl reactor at 1:24 am on 26 April 1986, a number of questions are being raised regarding the safety of the Soviet reactors. While the western experts had been expressing their doubts about the safety plans for the Soviet reactors even before, the Chernobyl accident has strengthened these doubts. Now even the Soviet people have become aware of the shortcomings of their reactors. In light of the policy of perestroika of Mikhail Gorbachev now things are appearing which could not have appeared before.

In this context an article was published on 20 May in PRAVDA on the deficiencies of Soviet reactors. In this elaborate article reference was made to the diary notes of the Soviet scientist V. Lagasov. Lagasov had written in detail about the defects of the Soviet reactors. This knowledgeable person of nuclear reactors had committed suicide under mysterious circumstances. The scientist, known to be a design expert of nuclear reactors, had stated clearly that Soviet reactors were of inferior quality. He had also mentioned that the kind of reactor safety evaluation that has been done by the U.S. experts like Rasmussen, has not been done in the Soviet Union. With regard to the design of Soviet reactors Lagasov has written that out of ten designs initiated by him five had failed miserably. In this situation only the future can tell how useful the Soviet reactors can be for us.

Now, granted, even if there will be some international safety arrangements for the Soviet reactors, there could be a problem in regard to the supply of fuel for these reactors. As these reactors will be using enriched uranium, we will have to depend only on the Soviet Union for its supply. This means that for the next 25 years the 2,000-megawatt capacity reactors can produce electricity only with Soviet cooperation. This situation will be similar to that of the Tarapur Plant for which the United States had promised to supply enriched uranium. However, when the Indo-U.S. relations turned sour the United States stopped supplying fuel for it. Consequently, both the units of the plant were about to be closed down. Fortunately, in the mean time, our scientists had already developed indigenous substitute fuel in

order to meet the situation. However, the need for using this fuel did not arise because France agreed to supply enriched uranium. Some people think that in order not to let us use the indigenous fuel and to keep the Tarapur reactor under international inspection, the United States prompted France to supply enriched uranium to us.

Although the Western nations have continuously been pressuring us for signing the nuclear nonproliferation treaty, because of the growing close relationship between the United States and the Soviet Union, if the Soviets begin placing similar pressure on India, it will create difficulties for us. Apart from these matters, the Soviet Union would like to get back to the used nuclear fuel. In case we agree to this we will be losing our credibility among the world's nuclear community, because we did not return the used fuel from Tarapur Plant to the United States. Because we had purchased the nuclear fuel we should have the right to the used fuel also. Since then, we have been keeping the fuel bars with us. The United States has again and again doubted that with the plutonium obtainable from the used fuel India could produce nuclear weapons. If the Soviet Union continues to press us for the return of the used fuel we will be put in a very awkward situation. On the other hand, we do not want to make enriched uranium from our limited resources of natural uranium. For this reason, we are making reactors that will use heavy water so that we could use natural uranium for fuel. Basically, it will not be easy for us to import the Soviet reactors which use enriched uranium.

It becomes clear from our dependence on foreign countries for our nuclear-electricity programs, that our planning in regard to nuclear energy as a whole has been poor. We are succeeding neither in designing the power plants and the equipment, nor in the production of nuclear fuel and heavy water. Despite the fact that our nuclear research and development program was started at the time of Dr Bhabha, India has been left much behind China in the important nuclear race, even though China started its nuclear program almost at the same time.

Safeguards Accord With IAEA Clears Way for Soviet Reactor

51500041 Madras THE HINDU in English
19 Oct 88 p 1

[Text] New Delhi, 18 October—The safeguards agreement between India and the International Atomic Energy Agency which covers the supply by the Soviet Union of a nuclear power station of two units of 1,000 MW(e) each contains a "no weapons use" stipulation, provisions for the application of IAEA safeguards on the reactors and nuclear material supplied, and a section that envisages the return of spent fuel to the Soviet Union.

The agreement is in pursuance of the consent obtained from the IAEA's Board of Governors on 14 September for the application of safeguards. It refers to the Government of India's arrangement for cooperation with the

USSR for the construction in India of a nuclear power station composed of two pressurised light water reactors of 1,000 MW(e) each. The reactors will use, as fuel, enriched uranium supplied by the Soviet Union.

Under Sections 2 and 3 of the agreement, IAEA safeguards will apply to the reactor facilities supplied by the Soviet Union under the arrangement and the reactor facilities produced from them or as a result of their utilisation; to any nuclear material supplied by the Soviet Union for use in the reactor facilities; to "any nuclear material, including subsequent generations of special fissionable material, produced, processed or used in or by the use of the reactor facilities or in or by the use of any other items referred to in this Section; and to any other item required to be listed" in the Inventory established by the IAEA.

Section 2 of the agreement states that India undertakes that none of the items brought under IAEA safeguards shall be used for "the manufacture of any nuclear weapon or to further any other military purpose" and also that "such items shall be used exclusively for peaceful purposes and shall not be used for the manufacture of any nuclear explosive device."

Section 3 states that the IAEA undertakes to apply safeguards "to ensure as far as it is able that no such item is used for the manufacture of any nuclear weapon or to further any other military purpose and that such items are used exclusively for peaceful purposes and not for the manufacture of any nuclear explosive device."

These supply-related safeguards are very different from the "fullscope safeguards" that the United States insisted on unsuccessfully in the early Eighties as a condition for the continued supply of low-enriched uranium fuel to the Tarapur nuclear power station. "Fullscope safeguards" would mean bringing India's entire nuclear energy programme and activity under external safeguards. The supply-related safeguards provided for in the case of the nuclear power station that will be set up in cooperation with the Soviet Union are a far cry from the other type of safeguards regime that has been found unacceptable to India.

Under the agreement, India will submit the reactor facilities to IAEA safeguards before construction or operation commences. It will also notify the international agency of the arrival of the reactor facilities or nuclear material supplied by the Soviet Union. The Safeguard Document, a standard framework or guidance document prepared by the IAEA, lays down the scope, method and procedure of safeguards application.

Under Section 13(b) of the India-IAEA safeguards agreement, "India shall notify the Agency of any intended transfer of any item listed in the Main Part of the Inventory to a recipient which is not under the jurisdiction of India. Except for those items transferred to the Soviet Union which were originally supplied by the

Soviet Union to India under the arrangement, and except for spent fuel produced therefrom and transferred to the Soviet Union, such items shall be so transferred only after the Agency has informed India that it has satisfied itself that the Agency safeguards will apply to such items."

In the case of any transfer of items listed in the Main Part of the Inventory to a facility within India's jurisdiction, India will notify the IAEA and provide the necessary information so that IAEA safeguards can apply to the items after transfer to such a facility. This is known as the "pursuit" clause of the IAEA safeguards regime.

Section 16 of the agreement provides for the termination of the IAEA safeguards under certain conditions: (a) on transfer of the items to the Soviet Union or to an external jurisdiction, (b) in accordance with the terms of the IAEA's Safeguards Document relating to nuclear material, and (c) on decommissioning the reactor facilities from possible use in "any nuclear activity relevant from the point of view of safeguards."

The agreement will remain in force as long as IAEA safeguards remain in place or there is mutual consent to terminate it. Section 26 provides for consultation on "any question arising out of the interpretation or application of this Agreement." Section 27 provides for the handling of any disputes concerning the interpretation or application of the agreement. They would be resolved mutually through negotiation, or in case that were not possible by reference to an arbitral tribunal composed of a designate each of India and the IAEA plus a third arbitrator elected by the two others.

The safeguards agreement with the IAEA clears the way, in a non-controversial manner, for supply by the Soviet Union of the light-water reactors and the enriched uranium fuel. The finalisation of the package is scheduled to be announced during the Gorbachev visit to India in November.

USSR To Supply Enriched Uranium for Proposed Nuclear Reactors

51500043 Madras THE HINDU in English
30 Oct 88 p 4

[Text] Madras, 29 October—The Soviet Union will supply enriched uranium to two nuclear reactors of 1,000 MW capacity each, which will be set up in India on "a collaborative basis with the USSR," according to Dr M.R. Srinivasan, Chairman, Atomic Energy Commission. The matter is still under discussion and a final decision will be taken in the next few weeks. The reactors will use enriched uranium and light water.

Dr Srinivasan told reporters here on Friday that the discussions related to the type of reactors, their safety features and so on. The design issue will be taken up a little later.

Asked whether the project would be executed on a turn-key basis, he said, "We will try and work for a construction period, which will be very short. If you are going to do that, you have to import most of the components and define responsibility on the party that is building it. Otherwise, you will lose schedule."

The units would cater for the needs of the southern region, which suffered from scarcity of electricity. Nagarjunasagar in Andhra Pradesh and Koodangulam in Tamil Nadu were on the list of sites under consideration.

Narora unit: Mr Srinivasan said the first unit of the Narora Atomic Power Project in Uttar Pradesh would attain criticality before the end of this year. Its second unit would attain criticality by the middle of 1990. The first unit of the Kakrapar Atomic Power Project in Gujarat would become critical by the end of 1990 and its second unit by the end of 1991. Work had also been started on four more reactors and two each would be situated at Kaiga in Karnataka and Rajasthan. They would become operational in 1995-96.

On other future projects, he said, "We have cleared sites for 10 more reactors." They would consist of four reactors of 235 MW each and six reactors of 500 MW each. They would be of Indian design and technology, using heavy water and natural uranium. The four units of 235 MW each would be set up at Kaiga alongside the two reactors of 235 MW capacity each. Thus, Kaiga would have a total of six reactors.

Of the six reactors of 500 MW capacity each, two would be erected at Tarapur and four would be located at Rajasthan. These 10 reactors would become operational between 1996 and 1998.

Answering a question, the AEC Chairman said the Government had sanctioned money for advance procurement of critical components for these 10 reactors.

Fast Breeder Reactor: He was confident that 10,000 MW of nuclear power would be produced by the turn of the century. "So we want to have 10,000 MW, based on reactors of Indian design and supplemented with a few from outside," he said. The prototype Fast Breeder Reactor of 500 MW capacity would go into operation at the end of 1990s at Kalpakkam.

The second unit of Madras Atomic Power Station at Kalpakkam, which had been under shut-down, would be restarted by the end of November. It had a problem in one of the calandria tubes in the reactor. The leaky tube had to be identified and the leak stopped.

"This second unit had averaged a capacity factor of nearly 66 per cent from April to August this year, when it was shut down due to an unusual problem, which is being investigated. We have with us the ability, expertise and experience to deal with such problems and this reactor is to recommence power generation in the near future," he said.

Asked about the Fast Breeder Test Reactor at Kalpakkam, he said it would be restarted by the end of this year. After successful completion of the low-power reactor physics experiments, the FBTR was shut down to complete the remaining construction and commissioning activities. Subsequent to completion of these activities and reactor start-up, an incident occurred which resulted damage to one fuel sub-assembly and some nickel and stainless steel sub-assemblies constituting the reflector of the reactor.

The damaged fuel-sub-assemblies could not be retrieved easily. But the technical problems at the FBTR had been resolved and the unit would become operational by the end of this year. It was a research reactor to understand the behavior of uranium carbide fuel.

The heavy-water production plants at Thal, Baroda, Tuticorin, Kota and Nangal were doing well. Plants were also being set up at Manuguru in Andhra Pradesh and Hazira in Gujarat. "We are considering (setting up) additional heavy-water plants," Dr Srinivasan said. He could not say where they would be set up.

Importing of Nuclear Material From FRG Denied
BK0601162889 Delhi Domestic Service in English
1530 GMT 6 Jan 89

[Text] An official spokesman today denied a report in a section of the press that India illegally imported some nuclear material from West German firms. It was alleged that the firms had exported reflector material and cadmium tubes to India and some other countries without obtaining government permission.

Responding to queries by newsmen, the spokesman clarified that reflector materials used in Indian nuclear research reactors are beryllium oxide, graphite, and heavy water. No such reflector material mentioned in the press reports has been imported by India from the Federal Republic of Germany. He said India has, however, imported some cadmium-bearing stainless steel tubes from the firm following an open tender and competitive bidding procedure. He said this material cannot be termed as nuclear material.

Ambitious Plan To Step Up Nuclear Fuel Output
S1500042 New Delhi PATRIOT in English
24 Oct 88 p 6

[Text] Hyderabad, 23 October (UNI)—The nuclear Fuel Complex (NFC) here, has drawn up an ambitious programme to step up production to a total capacity of 1800 tonnes of nuclear fuel per annum required for the envisaged generation of 10,000 mw of nuclear power in the country by 2000 AD.

This capacity will not only meet requirements of initial loads for the new reactors but also fuel replacements required for the operating units, according to Dr K. Balrama Moorthy, chief executive, NFC.

The present nuclear power generation in the country is 1230 mw.

Mr Moorthy said the nuclear fuel capacity would be expanded to about 300 tonnes per annum by October, 1990 from the present 80 tonnes per annum and 600 tonnes per annum by 1992-93.

The complex, located at Moulali near here, is a unique centre in the world where reactor fuel and other reactor core components are manufactured under one roof, starting from ore concentrate to finished ready-to-use products.

Dr Moorthy said the NFC was planning to set up units to produce zircaloy structural materials for power reactors, and the new production plants would be based on improved technology with more mechanised systems.

Under the programme, 80 tonnes of zircaloy products would be produced by March, 1990 as against the present 30 tonnes.

The requirement of zircaloy structural materials to achieve the total installed nuclear power generation capacity of 10,000 mw would be 250 tonnes annually.

The NFC has developed the prototypes for coolant tubes made of zirconium—2.5 per cent—niobium tubes instead of the present zircaloy tubes. The new produce, which has better irradiation creep resistance, mechanical properties and longer life, would be used for the Kakrapar second unit onwards.

India is the second country in the world after Canada, to produce high pressure coolant and calandria tubes, the two critical components used in the power reactor. The NFC had already supplied the initial natural uranium fuel to Narora Atomic Power Station which was likely to become critical by year end.

The NFC was likely to sign a Memorandum of Understanding with the Department of Electronics for the transfer of technology for the manufacture of very high purity (up to 99.999 per cent) materials like indium.

India's 1st Heavy Ion Accelerator Becomes Fully Operational

5150040 Madras THE HINDU in English 7 Nov 88 p 7

[Text] Bombay, 6 November—The country's first heavy ion accelerator of medium energy capacity, called "Pelletron," has become fully operational at the Tata Institute of Fundamental Research (TIFR) here.

Set up jointly by the Bhabha Atomic Research Centre (BARC) and TIFR, the facility accelerates heavy ion beams to sufficiently high energies suitable for advanced research in nuclear physics. The Pelletron is based on a tandem Van De Graaff accelerator with 14 million volts terminal voltage.

The components of the Pelletron accelerator were supplied by Electrostatic International Incorporated, USA, under a commercial contract.

MAPS Unit To Start Soon

5150047 Bombay THE TIMES OF INDIA in English 17 Nov 88 p 17

[Text] Kalpakkam, 16 November—Engineers at the Madras Atomic Power Station (MAPS) here have overcome the problem created by a pin-hole leak in a heavy water reactor vessel, (calandria).

It is a cylindrical, stainless steel vessel housing a network of 306 tubes containing nuclear fuel and handling 70 tonnes of heavy water used for transporting heat energy from the reactor to the power generator system.

It is a highly radioactive area in which the fault detection and repair job are done through complex remote control operations.

Though the heavy water leakage into the calandria vault was noticed in MAPS Unit-II in August last, engineers were not even in a position to ascertain the source of the trouble till about a month ago. The reactor unit, shut down in August is expected to be put back on line later this month.

A team of visiting newsmen from Madras were told that Unit-II with 235 MW capacity would become fully operational some ten days after the start-up (scheduled for 22 November).

The director (operations) of the Nuclear Power Corporation, Mr K.S.N. Murthy, and the chief superintendent of MAPS, Mr. V. Rangarajan, gave newsmen the low-down on the nature of the problem, the manner in which it was overcome and the things to be learnt to cope with similar problems in the future.

Heavy Bombardment

Three pin-hole leaks, throwing up jets of heavy water from the calandria tube led to the accumulation of heavy water in the calandria vault, an enclosed structure rendered inaccessible by high radiation. There was heavy bombardment of gamma radiation inside the reactor vessel.

Mr Rangarajan noted that the radiation level in the calandria of a reactor was comparable to the level of radiation caused by 1,000,000 X-ray exposures.

A calandria tube insulates the pressure tube carrying heated heavy water and nuclear fuel. In a reactor, heavy water is also used as a moderator to minimise heat loss.

The thing about the August incident is that it was for the first time MAPS engineers were faced with trouble in the Calandria tube.

"We were not prepared for a calandria tube leak," said a MAPS engineer. The process of detecting the fault involved a process of trial and error.

Initially, it was suspected that the leak was in the calandria tube at the R-12 lattice location, but the culprit turned out to be in the R-5 channel.

Identification

It took MAPS nearly three months to identify the fault. "In the process we have mastered the identification process," Mr. Rangarajan said.

The R-5 calandria tube channel has since been put out of operation. Engineers said that this would not affect the reactor operation or involve any lowering in the power output.

MAPS authorities are going ahead with the drill for putting the Unit-II reactor back on line. However, the question for which experts have yet to find an answer is: how did the tube develop the leak?

Narora Atomic Power Unit To Start 'This Month'

BK0301161889 Delhi Domestic Service in English
1530 GMT 3 Jan 89

[Text] The 235-megawatt first unit of the Narora Atomic Power Plant in Uttar Pradesh will be commissioned this month. This was revealed by the director of the Bhabha Atomic Research Center, Dr P.K. Iyengar. Iyengar also said that two more atomic power plants will be set up shortly. One such unit will come up at Kodamkuram in the southern region, while another unit will be added to the Rajasthan plant.

6 More Nuclear Reactors Proposed

51500046 Madras THE HINDU in English
18 Nov 88 p 11

[Text] Madras, 17 November—Proposals for setting up six more nuclear reactors of 500 MW capacity each will be submitted to the Government of India shortly, according to Dr. M.R. Srinivasan, Chairman, Atomic energy Commission. These units will be in addition to the six units of 500 MW capacity each for which sites have already been approved.

The sites already approved for the first batch of six nuclear reactors are the Tarapur Atomic Power Station

(TAPS) and the Rajasthan Atomic Power Station (RAPS). While the TAPS will have two units, the RAPS will have four.

Soviet reactors: Dr. Srinivasan also said the two Soviet nuclear reactors of VVER type of 1,000 MW capacity each that would be imported "are totally different from the RBMK type involved in the Chernobyl accident." (These two Soviet reactors will be set up at Koodangulam in Tamil Nadu). "The VVER units are pressurised water reactors of Soviet design and they have been operating well in the Soviet Union and other European countries. The decision has been taken only after a thorough examination and discussion of safety aspects by our experts from the Department of Atomic Energy and the AERB (the Soviet Atomic Energy Agency). They would be closely associated with the project during the construction phase so that any new additional safety features may be added, if required," he said.

"Regarding the safeguards, there are no conditions beyond what we accepted for RAPS while importing heavy water for RAPS from the Soviet Union.

The enriched uranium fuel will be supplied by the Soviet Union for the entire life and the spent fuel will be sent back to the Soviet Union. Thus there is no problem of any extension of the IAEA safeguards beyond the Soviet-supplied VVER power units," he said, in an address on the occasion of Founder's Day at BARC Trombay, on 31 October.

Uranium deposits at Cuddapah: According to Dr. Srinivasan expansion of production of nuclear fuel is planned both at the Nuclear Fuel Complex, Hyderabad, and at certain new locations. Work has commenced on a new mining project for uranium at Narwapahar. Exploratory activities for uranium are continuing and some promising ore bodies have been located in Meghalaya. There appear to be some potentially interesting deposits at Cuddapah in Andhra Pradesh, where exploratory work is being intensified. The heavy water production plants have functioned in a reliable manner and a substantial increase in production of heavy water over the previous years has been registered. Construction work on two more heavy water production plants at Manuguru in Andhra Pradesh and Hazira in Gujarat is progressing.

Four more reactors at Kaiga: Kaiga in Karnataka will have four more nuclear reactors of 235 MW capacity each in addition to the two units of 235 MW each which are under construction now. The TAPS will have two nuclear reactors of 500 MW capacity each in addition to the existing two units of 160 MW each. The RAPS will get two units of 235 MW each (under construction) and four units of 500 MW each. This will be in addition to the two existing units of 220 MW each. The first unit at Narora in Uttar Pradesh will go critical before the end of this year and the second in 1990. Both have a capacity of 235 MW each.

The Madras Atomic Power Station at Kalpakkam has two units of 235 MW each. Kakrapar in Gujarat will have two units of 235 MW each. Further, the Government is considering sanction of six more units of 500 MW each to make a total of 10,000 MW. All these units will use natural uranium as fuel and heavy water as coolant and moderator. The two Soviet reactors of 1,000 MW capacity each that would be imported to India will be in addition to the 10,000 MW programme.

Papers Report on Safety of Nuclear Power Plants

AEC Chief on Tarapur

51500044 Calcutta THE TELEGRAPH in English
24 Oct 88 p 4

[Text] Bombay, 23 October (PTI)—Off-site emergency exercises at some nuclear power stations in the country this year proved to be sound verification of the assumptions regarding time estimates and communication systems in case of an accident.

Addressing newsmen at Tarapur, 125 km from here yesterday, Dr M.P. Srinivasan, chairman of the Atomic Energy Commission and department of atomic energy was taking up with the concerned state governments the question of urgently upgrading the quality of roads within the 16 km radius of nuclear power plants.

Evacuation of people living within a 8 km radius could be done within 36 hours in case of emergency at Tarapur, top officials of the plant said.

Mock exercise were conducted this year in Kalpakkam, Rawatbhata, Narora and Tarapur.

Dr Srinivasan said off-site emergency exercises and underscored the urgent need for educating people about nuclear power generation.

Referring to the "panicky situation" leading to the desertion of villages around Tarapur on 8 October by local residents following the drill, he said a communication gap and rumours of a gas leak had triggered the scare.

The drill was carried out in coordination with the Thane district authorities after adequately briefing the sarpanches of five villages, he said. Most people in these areas could not read or write, he said.

Mr Srinivasan said a systematic public education programme involving the people around nuclear power installations was being launched. While there should be no habitation up to a radius of 1.6 km, which is the exclusive zone around a nuclear installation, people could live in the areas between 1.6 km and 5 km from the plant, Dr Srinivasan said.

More on Tarapur, Other Plants

51500044 Bombay THE TIMES OF INDIA in English
25 Oct 88 p 5

[Text] Bombay, 24 October—Calculation of collective doses of radiation through air and liquid routes up to a distance of 2,000 km radius from the Tarapur Atomic Power Station indicates a value of 376 man rem per gigawatt of electricity (GWe) generated per year.

This value was twice as low as the average dose recorded by some atomic power stations abroad, according to Dr M.R. Srinivasan, chairman of the Atomic Energy Commission.

This conclusion has been reached on the basis of crude estimates of published data elsewhere as no dose evaluations are available now regarding collective doses at plants of similar design as TAPS for comparison.

At Rajasthan Atomic Power Station, the total collective dose was 2005 man rem per GWe generated per year. In comparison, the heavy water reactors of Canada and Argentina discharged similar quantities of radioactivity. In some cases, the quantity of tritium was more and Argon-41 was less and in others tritium was less.

The Madras reactors based on the RAPS design showed a collective dose of 315 man rems per GWe per year.

The proximity of Ganga river has prompted the department to adopt stringent limits at Narora. A troublesome radionuclide, Argon-41, which constituted nearly 50 per cent of radioactive dose, has been entirely eliminated. In terms of collective dose, Narora reactor were expected to give less than 15 man rems per GWe per year, Dr Srinivasan told newsmen at Tarapur during the weekend.

He addressed the press after a function to commemorate the birth centenary of late Jawaharlal Nehru.

The collective dose from these nuclear reactors could be compared to the average burden of 60 to 100 man rems per GWe per year generated by the coal-fired stations, Dr Srinivasan pointed out.

Nagarjunasagar in Andhra Pradesh was still a prime site for locating a nuclear power station and the Union ministry of environment had cleared the site, Dr Srinivasan said. Following fears expressed by environmentalists that the lake could be contaminated, the department had provided data to allay the fears. The ball was now in the court of the state government, he added.

New Narora Station Safe

51500044 Bombay THE TIMES OF INDIA in English
10 Nov 88 p 5

[Text] Bombay, 9 November (UNI)—The department of atomic energy (DAE) has said that the Narora atomic

power station (NAPS) in Uttar Pradesh now ready for commissioning, does not pose safety and environmental problems for the people living in its vicinity.

Allaying apprehensions expressed in some quarters about the safety of the power station, the department had in a special issue of its monthly bulletin "Nuclear India," said the NAPS design meets all requirements laid down in the revised safety standards.

The design of the power station incorporates two independent fast-acting shut-down systems, high pressure, intermediate pressure and low pressure emergency core-cooling systems to meet short and long-term requirements, and double containment of the reactor building.

The cooling water to all the heavy water heat exchangers is maintained in a closed loop so that failures in these do not lead to escape of radioactivity to the public domain.

The station has a waste management plant and waste burial facility within the plant precincts. An environmental survey laboratory exists to study the impact of the plant operation on the environment, the report has said.

The plant will be commissioned and operated by well-trained, qualified and authorised personnel after due clearance by the atomic energy regulatory board (AERB).

The report says NAPS is the first pressurised heavy water reactor (PHWR) in the world that has been provided with double containment. The inner containment is pre-stressed concrete, designed to withstand the full pressure that is likely to be experienced in the event of an accident. The outer containment is of reinforced cement concrete capable of withstanding the pressure of 0.07 kg/cm square.

the annular space between the two containment is normally maintained at a pressure below atmosphere to ensure that any radioactivity that might leak past primary containment is vented out through the stack and not allowed to come out to the environment in the immediate vicinity of the reactor building.

The report says that the liquid waste management system at Narora is designed on the basis that no radioactive effluents, treated or otherwise, will be discharged into the river Ganga.

A comprehensive fire-fighting system at par with any modern power station has been provided at NAPS. It has a network of fixed fire hydrants, fire hour cabinets with reliable water supply fire tenders and portable fire-fighting equipment.

The report says DAE has also drawn up emergency plans for on-site and off-site emergency situation. These were reviewed by the safety review bodies in DAE before these units were made operational.

Details on Safety Precautions

51500044 Madras THE HINDU in English
28 Oct 88 p 8

[Article by Dr D.V. Gopinath, head, Safety Research and Health Physics Programmes, IGCAR, Kalpakkam]

[Text] Nuclear energy as a source of usable power has been facing a unique and essentially non-technical problem: a problem of perception. On the one hand there are claims that it can provide unlimited energy to meet our ever growing demands of power with minimum risk to the operating personnel as well as the public and minimum impact on the environment. On the other hand, there is also the view that it is environmentally disastrous and endangers the health of not only the operating personnel and public of the present generation but our progeny as well. Rather than dismiss these fears as technically unfounded, it would be prudent to analyse the reasons for this severe discordance in perceptions, establish a meaningful dialogue among persons with divergent views and assuage the genuine apprehensions about nuclear energy.

Detailed studies have shown that public perception of risks of nuclear energy can be classified as (i) environmental and physical risks, (ii) psychological aspects and (iii) socio-political implications.

The first two categories of public apprehensions are directly traceable to the vast amount of radioactivity and ionising radiations associated with the generation of nuclear power.

To ensure that these safety criteria are met at all times, a "defence in depth" approach is adopted in the Indian nuclear power programme. In essence, it means that wherever safety is involved, we do not depend on one single equipment or system; there would be ample backup so that failure of several systems even serially does not lead to unsafe conditions to the operating personnel or to the public. A few of its key points are elaborated below. The description is with reference to the Madras Atomic Power Station (MAPS), and is valid in principle for other nuclear power stations in India.

Redundancy in the Safety Related Systems

(i) Power Supply: Since the availability of power supply is crucial for safety during operation as well as shutdown state of the power reactors, it is mandatory that the power supply in general should have sufficient back up and the safety related system should have uninterrupted power supply. To ensure this, the MAPS has the following provisions:

(a) Grid power from three independent supply lines (Arni, Chengalpattu and Villupuram);

(b) Five standby diesel generators each with adequate capacity to take all essential loads of the station. They

are kept in a poised condition to start within 10 seconds of the loss of the grid supply;

(c) Uninterrupted power supply from motor-generators and inverters fed by storage batteries, to meet the reactor protection system loads.

(ii) Shutdown system: In case of any abnormal condition prevailing in the reactor or associated systems, it is designed to bring the reactor to a safe shutdown condition promptly and reliably. At MAPS the reactor shutting down is accomplished by rapidly removing the moderating heavy water, which is essential to maintain the chain reaction, from the system. To ensure that this removal occurs without fail the MAPS incorporates six dump valves in three redundant loops. Each one of these loops is designed for 100 per cent dumping within seven seconds. The dumping of heavy water can be initiated either manually or automatically by abnormal signals from any of the three independent monitoring systems called protective channels.

(iii) Coolant system: As mentioned earlier, the primary safety concern in nuclear reactors is the containment of radioactivity. Since any overheating of the fuel can lead to a breach of the integrity of the fuel elements they need to be provided adequate cooling at all times, during normal operation as well as shutdown conditions. This is ensured by the following arrangement:

(a) Eight Primary Heat Transport (PHT) Pumps with four always operating; (b) two auxiliary feed pumps running on emergency diesel power supply; (c) steam blowing and shut down cooling arrangement; and (d) Moderator injection.

In the extremely unlikely event of none of the above systems being available, provision exists to provide cooling from the fire-water system with a capacity of 7.5 million gallons. Availability of at least 4.5 million gallons of water in this system is a prerequisite for reactor operation.

(iv) In spite of all the provisions made in the design and operation of the reactor to prevent any overheating of the fuel and consequent fission product release, it is recognised that no system can be absolutely fail safe. To ensure that even in an unlikely event leading to fuel damage the fission products are not released to the public domain, a series of barriers are provided for the containment of radioactivity. The fuel, which is a sintered ceramic of uranium oxide, provides the first barrier. The fuel is clad in a high strength, high integrity alloy of zirconium and this acts as the second barrier. Further, all the fuel elements, that is, the fuel clad in zircalloy reside in the PHT system which is closed loop type and is isolated from other parts of the reactor system. The PHT system is the third barrier for containing the fission products. As the fourth barrier, the entire reactor system is housed in a "containment" building. The containment building is designed, constructed and

tested such that its leak rate does not exceed 0.1 per cent of its volume per hour even under the highest pressures that can result from the worst possible accident. Further this building is enclosed in another "secondary containment" and the space between the two buildings is constantly monitored. In case any radioactivity appears in the interspace, provision exists for the air from this space to be pumped for controlled release through high efficiency filters.

Unique Feature

Besides all these barriers, as an abundant precaution against public exposure, the area up to 1.6 km around the Indian nuclear power reactors is treated as "Exclusion Area." This area is owned by the power plant and all public activities are excluded. The region beyond 1.6 km and up to five km is also treated as a controlled zone where industrial activities leading to undue growth of population are restricted.

A unique feature of the nuclear power programme is that detailed and multi-layered safety analyses and explicit safety clearances are prerequisites for all its activities. Right from the stage of the design of the reactor, through site selection, construction, commissioning and operation, there exist at least three independent safety groups acting serially before the activity is cleared. In general, there is a Unit Safety Committee independent of plant management, which makes detailed safety evaluation of the design and operation. After ensuring that safety requirements are met, the Unit Safety Committee makes its recommendations to a Central Safety Review Committee. After its independent analysis, recommendations of the Central Safety Review Committee are placed before the Atomic Energy Regulatory Board, which gives the final safety clearance.

Another feature, which again is probably unique to nuclear technology, is the concept of "design bases accident (DBA)." At the very beginning, it is essential for the designers to make an elaborate accident analysis. They must examine all the likely accidents in the system and establish that even in the case of the most severe accident with as low a probability as 10^{-6} /year (that is, one in a million years) the likely radiation exposure to the public is below the permissible limits.

Notwithstanding all the inherent and engineered safety provisions existing in the reactors, it is recognised that properly trained operating crew is the vital element against unsafe situations. Hence a great deal of importance is given to the rigorous training and qualification of all the operating personnel.

Besides having an adequate academic qualification and 4 to 12 years' experience, the personnel have to complete the checklist, an elaborate written examination and a walk through test. Finally, the operators are qualified only after passing a viva voce examination conducted by

a committee including experts from outside the station. Further, the operating crew are required to be requalified periodically to ensure that the required calibre is always maintained.

Safety Performance

All the safety provisions made in the design and construction of nuclear reactors do not complete the task. The final evaluation of the safety of nuclear power has to be based on its performance record. To ensure that all the designed safety intents are met in the operation and to avoid any situation likely to affect the safety of the operating crew or the public, the following "checks" are incorporated for plant operation.

(i) Technical Specifications: Any system or equipment is designed to operate safely only up to a particular extent of "loading." This is termed the "safety limit." To account for the possible uncertainties in the measurement or estimation of the system loads and to provide sufficient allowance for the transient phenomena, one more set of limits called the "limiting conditions for operation" (which are well below the safety limits) are prescribed for all the nuclear reactors. These limits and conditions, along with the bases used to arrive at them are documented as "technical specifications." It is mandatory that no operation shall be planned which may lead to the violation of technical specifications.

(ii) Health physics: Surveillance of the radiation status, such as radiation fields in different areas, exposure to the operating personnel and release of radioactive effluents, etc., in a nuclear power plant is carried out by a well-qualified and trained group of persons called "Health Physicists," and this group is independent of the plant management. It provides a round-the-clock monitoring of the station and maintains a complete record of all the data related to the radiation exposure and radioactivity discharges from the station.

As a result of the due importance given to safety in design, construction as well as the operation of power reactors, the safety record of the power stations so far has been quite satisfactory. The radiation exposure of the plant personnel, exposures to public, atmospheric and aquatic discharges of radioactivity over the years from different nuclear power plants in India have at no instance exceeded the internationally accepted limits. In most of the cases they have been far below the limits.

Unusual Occurrence

While on the subject of the safety performance of nuclear power stations, it would be in order to deal with a term which has drawn considerable public attention: Unusual Occurrence. As mentioned earlier, wherever the safety of the plant personnel or the public is involved, the nuclear reactors are provided with multilayered protective systems. The principle behind such provision is that even if

one (it could be two or three depending on the importance) protective system fails, it should not result in a situation which is unsafe to the personnel. Thus the design accounts for the failure of one or two protective systems in series. However, failure of any one system is considered an "Unusual Occurrence" not because it has already resulted in an accidental situation but because one of the several barriers is disturbed. Unusual occurrences are nothing specific to nuclear power plants; they occur in all the industrial plants. The only difference is that in the nuclear industry the occurrences are reported, analysed and used for backfitting the system concerned to improve its reliability.

Comparison of Risks

Finally, it would be quite informative to compare the safety and environmental impact of nuclear energy with other available sources of power. In Table-I is given the world scenario of accidents and fatalities for power production from nuclear and coal sources. It can be seen that accidents and fatalities in the case of nuclear power are of an order of magnitude less than that for coal power.

The major concern regarding the environmental impact of nuclear power plants stems from the possible increase in the radiation levels of the environment. However, the experience so far has indicated that this fear is totally unfounded. The increase in the radiation level at the site boundary of the three nuclear power stations in India is in the range of 4-6 millirem per year. These levels are to be compared with the natural background radiation due to terrestrial radioactivity and cosmic rays. While the normal background radiation dose is 100-200 millirem per year there are regions where it is 1000 millirem or more because of high radioactive mineral deposits. Thus the increase in the environmental radiation level due to a nuclear power station is insignificant even when compared to the variations in the natural background. As a matter of fact this is the premise on which the whole philosophy of risks due to radiation and permissible exposure limits has been arrived at.

Assessing Overall Impact

While assessing the overall environmental impact, it is necessary to consider various other routes by which the environment is affected by different energy alternatives. As against vast submergence of land and consequent loss of forest area and/or large scale rehabilitation involved in the case of hydel power, the land requirement for nuclear power is insignificant. To quote from the analysis of the Chief Forest Conservator of Karnataka, "in the case of all the hydel projects set up in the past, those under construction and proposed in Karnataka, the forest area cleared is 18.6 hectares per MW of electricity. In the case of Kaiga (nuclear power plant) it is 0.06 hectare per MW or about 0.32 per cent of the area

required by hydel power. Hence, if we accept that power generation is a necessity, a forester from the point of conservation of forests would opt for nuclear power rather than hydel power."

Radioactive Waste

As against these pollutants from the coal fired stations, in the case of nuclear power, one has to encounter radioactive waste and this has drawn considerable attention of the public. There has been intensive effort effectively to contain and store the radioactive waste and technical solutions have been obtained. However, there is still the concern that the integrity of such containment cannot be assured over hundreds of years for which it is intended and eventually the radioactive waste can appear in the open environment.

If one makes a quantitative analysis taking into account the known behaviour of the materials used for the containment, the possibility of its failures and the likely leak rate, the radioactive decay of the waste products and the dilution that may occur during its passage from storage to an open environment, it would be seen that the problem posed is nowhere near as serious as perceived. Without going into those details, we can obtain an idea of the difference between perceptions and facts if a comparison is made with the health risk posed by common chemicals and that posed by radioactive waste from nuclear power stations.

The intention of making the above analysis is not to make a case against hydel or coal power. As a matter of fact, not having adequate power could have the most detrimental impact on our progress and wellbeing and we need to tap every available source of power, albeit safely and judiciously. The analysis is only intended to show that no power source is free from risk and the risk in the nuclear power option is no more than that from other available sources of power. It is, in fact, a great deal less.

Tamil Nadu Nuclear Power Plant Dubbed 'Time Bomb'

41500045 Bombay THE TIMES OF INDIA in English
1 Nov 88 p 17

[Text] Madras, 3 October—The atomic energy department organised, on Friday, a seminar of "atom for peace, power and prosperity." The anti-nuclear activists reacted on Saturday with a public meeting at which the slogan was, "better be active now than be radioactive tomorrow."

The chairman of the Atomic Energy Commission, Dr M.R. Srinivasan, and the Tamil Nadu governor, Dr P.C. Alexander, were the main speakers at the official function, held to commemorate the 40th anniversary of the country's independence and Nehru's birth centenary.

The leading light at the public meeting was Dr C.N. Deivanayagam. A spirited public figure committed to the anti-nuclear cause, Dr Deivanayagam is the convener of "physicians for peace." The meeting was organised by a public interest group called "Citizens for a Nuclear-Free World" (CNW).

Dr Alexander called on the scientific community to convey to the layman that the government had taken the "right step" in harnessing atomic energy for peaceful purposes. His point was that scientists should step out of research labs to take part in public lectures and seminars so as to carry the people with them.

The Atomic Energy Commission chief asserted that the nuclear power plants were properly equipped to ensure that accidents (of the nature of Chernobyl) did not occur. What Dr Srinivasan seemed concerned about was the damage done by scare-mongers who spread the notion that the nuclear power generation was a hazardous proposition and so the nuclear programme should be scrapped. Citing statistics about nuclear power plants in various parts of the world, he spoke of the increasing share of the nuclear power component in the total energy generation in the world.

Dr Srinivasan made out a convincing case for development of nuclear power as the prime source to meet the country's growing energy requirements in the coming decades.

The accent was on safety hazards at the CNW meeting. The speakers said it was time the government reviewed the nuclear power programme. They called for the scrapping of all expansion plans. The organisers said the public meeting was convened to raise "pertinent" questions on the advisability of the department of atomic energy adopting an "aggressive" nuclear power programme. It opposed the government's decision to go in for two 1,000-MW nuclear power plants of the Soviet design to be located at Koodankulam in Tirunelveli district.

A background note prepared by the "citizens for a nuclear-free world" referred to protest meetings held in Madurai, Tirunelveli and at Idinthakarai, a coastal village close to the site of Koodankulam nuclear complex. The village protest meeting, held in August last, reportedly attracted over 1,000 people.

The CNW paper described the Koodankulam project as "another time-bomb" and raised issues pertaining to the criteria adopted by the authorities for site selection, the threat to livelihood of the people in the area and assessment of the environmental impact of the project. It said 25,000 people in the area around Koodankulam village faced eviction as a result of the nuclear plant. Fishing activities of the people in the 75-km coastal belt from Uvari in Chidambarnar district to Muttom in Kanyakumari district would be affected. Farming in an area within a 10-km radius of the proposed power plant

would face "severe curtailment, leading to eventual eviction" of farmers from Radhapuram, Vijayapatti, Chettikulam and other villages.

The anti-nuclear activists called for a public inquiry into the fall-out of the existing nuclear energy projects in socio-economic and environmental terms before the government took up fresh projects. A CNW position paper on the atomic energy department's Indian Rare Earths (IRE) plants said there was a proposal to set up a plant at Kuthiraimozhi in Chidambarnar district. The project estimated to cost Rs 25 crores would be spread over an area of 2,500 hectares. The plant would have a capacity to process 75 tonnes of mineral sands a day. The processing of monazite sands yielded thorium.

Toxic Wastes

The Centre for Industrial Safety and Environmental Concerns (CISEC) at Quilon in Kerala is reported to have collected evidence to show a discharge of tonnes of toxic waste and radionuclides into the Periyar river over the years from the IRE plant in Alwaye. In the sixties, an estimated 3,000 tonnes of radio-nuclides held in barrels were dumped into the sea off Cochin, contaminating the coastal marine life in an area with intense fishing activity. The CNW paper observed that the dumping of radio-active waste into the sea stopped only after the Central Marine Fisheries Research Institute (CMFRI) learning about the radio-active waste disposal, intervened to put an end to the practice.

The IRE plant at Alwaye processes 4,000 tonnes of monazite sands annually. It has buried over 5,000 barrels of radio-active wastes within the IRE complex and stored in silos (built over 20 years ago) nearly 16,000 tonnes of radio-active hydroxide, according to the CISEC study. The hydroxide is meant for the fast-breeder programme. The buried radio-active wastes and the hydroxide stock held in silos are said to be close to the Periyar river and any leakage in the radio-active material could cause contamination of the river.

The CISEC findings gave rise to a public campaign demanding an inquiry into the Alwaye IRE plant. An expert committee, set up for the purpose by the department of atomic energy, is reported to have concluded that the discharge of waste from the Alwaye plant was "well below permissible limits."

Another CNW campaign document on the Kalpakkam reactors, over 75 km from Madras, noted that though an environmental Surveillance Laboratory (ESL) was set up at the complex over a decade ago, the authorities had not done a health survey of the population around the nuclear project. Such baseline data are essential to assess the long-term impact of the nuclear power projects, it says.

Light-Water Leak Reported at Nuclear Power Plant

BK0801031589 Delhi Domestic Service in English
0240 GMT 8 Jan 89

[Text] An investigation has been ordered into a light-water leak from the south end shields last month in one of the units of the Rajasthan Atomic Power Plant. An official spokesman said in Bombay that the leak appeared when the unit was operating steadily at a power level of about 90 megawatt. Detailed investigations will be carried out from Monday [9 January] after allowing a cool-down period of 10 days.

Test of New Surface-to-Surface Missile Planned

BK0901092089 Hong Kong AFP in English
0842 GMT 9 Jan 89

[By Pratap Chakravarty]

[Excerpts] New Delhi, Jan 9 (AFP)—India plans to test a new surface-to-surface missile it has developed in a bid to boost its own defence industry and slash defence imports, Defence Ministry officials said here Monday [9 January].

The test of the surface-to-surface missile codenamed Agni (fire) would be India's first attempt at launching a military rocket with the capability and range of an intermediate range ballistic missile (IRBM), the officials said.

Agni, which caps India's ambition to develop locally-built world-class missiles, would have a range of 2,500 kilometres (1,553 miles) and would be launched in the coming months from a temporary test range in eastern Orissa State, the officials said.

The state-owned Defence Research and Development Laboratory (DRDL), which developed the missile, has not officially announced the scheduled date for the test, but defence experts here said the missile could be launched within the next three to four months. It would feature a first-stage solid propellant engine and a second-stage liquid-fuel motor which would use conventional strap-on technology.

In July India unsuccessfully tested a locally-built augmented satellite launch vehicle (ASLV) which crashed into the Bay of Bengal 150 seconds after take-off.

Scientists at the DRDL in southern Hyderabad city decided to use a conventional first-stage engine with a range of 1,500 kilometres (932-mile), similar to the one used in the SLV-3 class rockets and a twin microprocessor-based missile guided system, officials here added.

An IRBM-class missile would be capable of carrying conventional and nuclear warheads, experts said.

JPRS-TND-89-001
13 January 1989

19

NEAR EAST & SOUTH ASIA

The Defence Ministry kept the missiles development a secret until now, claiming that work at DRDL only concerned the building of another surface-to-air rocket.
[passage omitted]

India's defence spending in 1987-88 was 9.6 billion dollars, or 20 per cent of total government spending, and observers said it could reach 11.5 billion dollars in the coming financial year.

Officials Cited on Armenian AES Safety
PM2912155388 Moscow KOMSOMOLSKAYA
PRAVDA in Russian 24 Dec 88 p 1

[M. Degtyar report under the rubric "Pointed Question": "AES: Rumors and Facts"]

[Text] It is known that rumors, like facts, are stubborn things. And it is not as easy to refute them as it might seem. For example, people have already written about the state of the Armenian AES, which was just within the earthquake zone. Nevertheless, the squall of calls is not dying down. What incredible and sometimes even provocative assumptions are made! For example, Moscow specially arranged a nuclear explosion in the region of the AES, thus causing the earthquake. There is a lot of talk about a dangerous wind pattern—the wind allegedly carries radioactive discharges precisely toward Yerevan...

I called L.M. Voronin, USSR first deputy minister of nuclear power generation.

"The station withstood the underground shock and is working normally, and we have no complaints. The rumors of an explosion are utter nonsense, and I do not even wish to speak of this..."

Yes, the deputy minister reported information of fundamental importance. But very scant information. Perhaps other specialists will prove more talkative?

V.I. Kondratyev, chief engineer of the USSR Nuclear Power Generation Ministry Main Control Administration:

"A special nuclear explosion is, of course, nonsense. We have complete confidence in the Armenian AES. The equipment has operated reliably. As is known, the underground shock in the region of the station was force 5.5, but the station was constructed to withstand force 8. If there was a force 6 earthquake, say, in the region of the station, earthquake sensors would operate, and the reactors would be stopped. There was merely an automatic frequency unloading of one of the reactor units, as large groups of consumers of electricity were cut off simultaneously. The frequency in the power system increased correspondingly, and the second reactor unit was unloaded from 400 down to 350 megawatts. This is absolutely normal."

"And yet, Viktor Ivanovich, is the Armenian AES 'strength factor' adequate, and what will its fate be? What can you say about the 'radioactive' wind in the direction of Yerevan?"

"The buildings constructed in Leninakan to withstand a force 9 underground shock did so. And I am sure that the AES will also withstand one. As for the station's fate, as far as I know it will function for 2 more years. Other energy sources will be found in the longer term. As regards radioactivity, the Armenian AES is totally ecologically clean. Radioactivity is at the background level. This is now being carefully monitored by specialists of the AES itself

and of the USSR State Committee for the Supervision of Safe Working Practices in the Atomic Power Industry."

Cutbacks in Nuclear Power Plants in Quake Zones

PM0901112989 Moscow ARGUMENTY I FAKTY in Russian 6-12 Jan 89 (signed to press 5 Jan 89) p 8

[Reader's letter followed by unattributed comment; first two paragraphs are the letter]

[Text] Will nuclear power plants in the country's seismically dangerous regions be closed down?

K. Maslov, Yalta.

At present 16 plants with 45 reactors with a capacity rating of 34.4 million kilowatts are operating in the USSR. In 1988 they produced more than 215 billion kilowatt-hours of electricity, which makes up about 12.7 percent of total production in the country. The construction of nuclear power units at 15 more sites continues.

In the USSR a package of measures is being implemented to increase the safety of nuclear plants in operation, those being built, and those planned. The requirements for places to locate stations have become stricter. Because of the high seismicity of the areas chosen and the introduction of stricter norms for siting nuclear plants, design and construction have been halted in Azerbaijan, Georgia, Krasnodar Kray, at the second phase of the Armenian plant, and at the nuclear central-heating and power plants in Minsk and Odessa.

Taking into account the fact that, according to certain parameters, the Armenian nuclear power plant does not accord with modern norms, even before the earthquake the shutdown of the first power unit was planned for 1990 and the second for 1991. The timetable for its shutdown will finally be determined after the completion of research now being conducted by the seismologists in the region of the station.

An Interdepartmental Council for Information and Ties to the Public in the Nuclear Power Sphere has been set up with the aim of analyzing public opinion, ensuring glasnost, and monitoring the safety of nuclear plants' work. More than five ministries and scientific and public organizations will take part in it.

'Leading' Scientist on Chernobyl Study Progress
LD2212142088 Moscow TASS in English
1302 GMT 22 Dec 88

[Text] Kiev, 22 December, TASS—Fuel samples from the fourth reactor building at the Chernobyl nuclear power station, which was damaged at a 1986 accident and has since been encased in steel and concrete, have shown that there is neither a chain reaction nor any dangerous abnormalities in the fuel's condition, according to a leading Soviet atomic scientist.

Igor Kambulov heads a group from the Igor Kurchatov Institute of Nuclear Energy, which is conducting a comprehensive study of the situation at the Chernobyl station.

"Our mission is to investigate the damaged building and find out the whereabouts, amount and condition of radioactive debris," he said.

"It is also essential to predict how it will behave, and take measures to rule out any possibility of a spontaneous chain reaction.

"This is why we continuously monitor the situation using television and still cameras and take regular instrument readings," the scientist explained.

The results of the study, he went on, support data passed by Soviet specialists on to the International Atomic Energy Agency, including their estimates that 95 to 96 per cent of the fuel remained inside the damaged reactor building.

The sarcophagus, the massive protective covering built over the generating unit after the accident, was designed to last for 30 years and "we are now considering options for neutralising the remaining fuel," Kambulov said.

He added that one of the options was burying the crippled reactor under an earthen mound.

"Attractive as it appears, I personally find it more expedient to retrieve the fuel and rebury it dependably in a special site. This is technically feasible," Kambulov continued. He admitted, however, the job would take time and cost a lot.

As an example, the scientist pointed to the U.S. Three-Mile Island nuclear power station which also has had an accident. The Americans are still retrieving fuel and sending it for burial elsewhere. This work continues although the accident took place in 1979.

To the question of when similar operations could start at Chernobyl, Kambulov said that this or another option had first to be chosen, after weighing all cons and pros.

"At this stage efforts are being directed at making the protective structure more reliable and reduce to a minimum the influence of the crippled reactor on the environment.

"Much is being done to improve working conditions for the station's personnel and wide-ranging and long-term research efforts are under way," the scientist said.

Capacity of Nuclear Power Station To Triple
LD2012112788 Hamburg DPA in German
1758 GMT 19 Dec 88

[Text] Munich/Ohu (DPA)—The Soviet Union intends to triple its nuclear power station capacity from a present 35,000 megawatts to over 100,000 megawatts by the year

2000. The chairman of the State Committee for the Utilization of Atomic Energy in the USSR, Prof Aleksandr Protsenko, said in Munich today, after a visit to the nuclear power station Isar II in Ohu, near Landsbut, that this increase is to be achieved by the construction of four to six new nuclear power stations and the expansion of the existing plant. He also stressed that the development of atomic energy in the Soviet Union was progressing more slowly than originally planned.

New types of reactors are now being developed in the Soviet Union, and existing types are being made safer. Protsenko said that a new type of pressurized water reactor is being built in collaboration with Siemens. Three Federal Republic firms are involved in the development of a high-temperature reactor in the USSR. Together with safety experts from Sweden, the Federal Republic, and the GDR, guidelines for the planning and operation of nuclear power stations are being laid down, in which "the best from each of the other involved countries is to be adopted." The goal here is to raise safety standards. The development of the "fast-breeder reactor" is progressing more slowly than planned. At present, a plant of this type with a capacity of 1.6 million kilowatts is at the planning stage; three such types with capacities of from 350 to 800 megawatts are already in existence.

According to Protsenko, a nuclear power station in Armenia was not damaged during the recent earthquake. It was designed for earthquakes of up to nine on the Richter scale, but, as it did in fact lie on a tectonic fault, it would, within the framework of the safety retrofitting of the existing plant, probably not be modernized but be shut down in the long run. The only other larger source of power in Armenia, an oil-fired power station, was badly damaged and is no longer in operation.

With regard to possibly dispensing with nuclear energy, Protsenko stressed that this would, as a result of environmental pollution through the use of coal-fired power stations as alternative sources of power, "mean the deaths of several hundred thousand people." Opponents of nuclear energy are obviously prepared to take this into account. The development of nuclear energy could also help prevent growing environmental problems such as the greenhouse effect.

Tokamak-15 Thermonuclear Unit Starts Up
PM0601150989 Moscow IZVESTIYA (Morning
Edition) in Russian 30 Dec 88 p 3

[IZVESTIYA scientific observer B. Kononov report:
"Earthly Star. Ceremonial Inauguration of Soviet Tokamak-15 Thermonuclear Installation"]

[Text] Physicists with a knowledge of controlled thermonuclear reactions at first hoped that the problem would be solved rapidly, but, alas, it has proved the most complex and difficult in the science of the 20th century.

One can say with confidence that the ultimate goal—the creation of a thermonuclear power station—will only be achieved in the 21st century.

That is why scientists record every major stage on this long and difficult road as a cause for celebration. The creation of the Tokamak-15 installation was just such a stage for Soviet physicists. When it reaches its design performance our scientists will get the chance to carry out thermonuclear research in the most advanced area of this field of science and technology. The Tokamak-15 will be one of the largest and most sophisticated modern thermonuclear installations.

There were very many people at the ceremony to mark the physical start-up of Tokamak-15, which was held on the evening of 28 December at the I.V. Kurchatov Atomic Energy Institute, although it was basically only those involved in the installation's creation who were present. It would be more accurate to describe it as a complex because it is housed in several buildings. Its weight—1,500 tonnes—gives the best indication of its scale. Moreover, it's not merely a question of tonnage but of the supreme achievements of many sectors.

The heart and "soul" of the new thermonuclear installation is its superconducting magnetic system. This is based on niobium—a compound of tin—the most promising of the so-called low-temperature superconductors. This intermetallic compound is reminiscent of glass in terms of its fragility. If this material is struck with a hammer, it immediately turns to dust. Nevertheless it has been possible to manufacture cables from it for winding magnetic coils.

This "cable" is a most complex system. Some 150,000 superconducting fibers are laid in a solid copper matrix. Each one is one-tenth the thickness of a human hair. There are two circular channels here through which liquid helium circulates, cooling the entire "cable" to a temperature approximately 5 degrees above absolute zero. The current flows without loss, and a powerful magnetic field is created. Moreover, this is a quite stable state. It is the first time a technology using niobium (a compound of tin) on such a large scale—the superconducting system weighs 100 tonnes—has been applied in world practice. The new thermonuclear installation has been constructed from just such supreme achievements on the part of many branches of science and technology.

Academician B. Kadomtsev compared it at the meeting with an organ in whose creation the art of many people and organizations from the Soviet Union and fraternal socialist countries has been interwoven. Physicists now have to learn to "play" this organ and create scientific symphonies.

"We will use only pure hydrogen plasma in this installation," Kadomtsev told me, "in order not to generate a powerful flow of neutrons. The temperature of the plasma will be approximately 100 million degrees, and

the density is sufficient to maintain a stable thermonuclear reaction from the fusion of hydrogen nuclei. The task is to learn to control the plasma as the working medium of a future thermonuclear reactor. Tokamak-15 is the last pre-reactor stage."

"What will be the next step?"

"A reactor that will be used to work out questions of nuclear technology linked to the use of tritium and a series of ecological safety measures for future thermonuclear power stations."

"That's not only our problem but one that affects all mankind...."

"Yes. The next step clearly will be an international one. Design work has begun on an international experimental thermonuclear reactor—IETR for short—under the auspices of the IAEA. The USSR, the United States, Japan, and the West European countries' Euratom organization are involved in the cooperation. An outline draft will be made in 1989-90, and the technical design work will be carried out in 1991-95. If everything proceeds normally, construction may begin in 1996. The IETR should demonstrate the reactor's operational capability and the potential for obtaining electricity. After this it will already be possible to create a thermonuclear reactor that will produce more power than it consumes. Then a succession of commercial thermonuclear power stations will follow.

Nuclear Power Plants for Space Vehicles Developed

LD0501122089 Moscow TASS in English
1159 GMT 5 Jan 89

[Article by TASS scientific observer Nikolay Zheleznov]

[Text] Moscow January 5 TASS—Soviet scientists and engineers are stepping up the quest for non-traditional energy sources for space vehicles. Another step in this direction was made last year: a series of flight tests of a new thermoemission nuclear energy-generating installation were carried out. Two 10-kilowatt power installations were launched on board the Cosmos satellites. One of them successfully functioned in orbit for six months and the second one for a year.

Taking into account the lively interest displayed by world scientific circles in these developments, the USSR State Committee for the Use of Nuclear Power is sending a group of specialists who took part in the development and testing of new energy sources to Albuquerque, in the United States, where a symposium on space power engineering opens on January 6.

The flight tests are the result of many years' work under the Soviet Topaz programme. Georgiy Gryaznov, one of the heads of the programme who will also attend the Albuquerque symposium, said that a nuclear reactor

which is a combination of a heat source (the Tvel heat-producing element) and a thermoemission transformer had become a basis of a compact and comparatively light energy source which practically does not consume fuel. Because of its high efficiency the reactor can well be used in future power-intensive space vehicles.

Prof Gryaznov pointed out that, for the purpose of ensuring radiation safety, high-orbit satellites had been used in flight tests. Their passive existence time is about 350 years, which is enough for the decay of fission products to a safe level. The installations were manoeuvred and brought to full capacity on orders from earth. This method of ensuring radiation safety, which has been tested in the USSR on more than one occasion, can serve as a basis for further developments connected with the creation of safe space vehicles with nuclear power sources.

Ignalina Reactor's Future Discussed, Opposed

LD0401144889 Vilnius in Lithuanian to North America 0100 GMT 3 Jan 89

[Summary] The future of the third reactor at the Ignalina nuclear electric power station was discussed by five working governmental commission groups set up in Moscow at the demand of the Lithuanian SSR Government. The governmental commission consists of leading Soviet nuclear specialists and representatives of departments involved.

The commission was set up last September by the USSR Council of Ministers.

The following issues were investigated: seismological conditions in the third power unit construction area, engineering and hydrogeology, water supply, and the influence on the environment.

Julius Sabaliauskas, deputy chairman of the State committee for Environmental Protection, commented on the work carried out by the commission and said that two working groups were clearly against the continuation of the construction of the third reactor without additional investigation and research that would last more than a year, and three other groups were of the opinion that the construction could go on provided that some corrections were made to the design.

However, the group from the republic taking part in the conference decided that a republican variant of conclusions should be prepared on the basis of the materials produced by the commission's working groups in an attempt to formulate such conclusions, which would be most correct, according to Lithuanian specialists.

This was done practically during a 24-hour period and Academician Vilimas, specialist in nuclear power engineering, and Prof Juodkazis, specialist in geology, went

to see Academician Frolov, vice president of the USSR Academy of Sciences and chairman of the commission, to present the republican opinion on the matter.

After two meetings with the academician and meetings with a number of members of the commission who supported the republican document, Academician Frolov signed the republican protocol after insignificant changes were introduced.

Now Academician Frolov has informed the USSR Council of Ministers that the commission had completed its work and that in the nearest future the protocol would be submitted to the USSR Council of Ministers.

The main conclusion is that the construction of the third power unit at the Ignalina power station should not be continued. The commission proposes that the present capacity of the power station be maintained while research work, which should have been carried out before the design work of the power station had started, is carried out.

The republican authorities should watch carefully for the issue of the Ignalina power station to come up on the agenda of the USSR Council of Ministers for discussion and take firmly the position adopted some time ago, so that the resolution adopted will be acceptable to the republic.

The resolution could be different since about one-third of the commission members did not sign the document prepared by the scientists of the republic and are categorically against the opinion voiced by the Lithuanian scientists.

For the first time in the 8-year-long argument between specialists from Lithuania and the designers of the power station, it has been pointed out in the resolutions adopted by the commission that if the the third power unit is constructed and put into operation there would be a shortage of water for cooling the reactor. The amount needed would be 14 million cubic meters.

The final decision could be also influenced by the international commission of experts that had been invited by the Soviet Government.

Gosatom Official on Nuclear Waste Disposal

PM2812150988 Moscow LITERATURNAYA GAZETA in Russian 28 Dec 88 p 9

[Interview with B.A. Semenov, first deputy chairman of the State Committee for the Utilization of Atomic Energy, by Aleksandr Istomin and Yaroslav Skvortsov under the rubric "Pertinent Response": "Where Nuclear Waste Goes"; date and place of interview not given]

[Text] Concerned about the news that the State Committee for the Utilization of Atomic Energy [Gosatom] is preparing an agreement under which the USSR is to

receive radioactive waste from the FRG for burial on USSR territory, a group of Moscow readers has written to the editorial board. At the request of the letter writers we approached B.A. Semenov, first deputy chairman of the USSR Gosatom.

[LITERATURNAYA GAZETA] How accurate is our readers' information?

[Semenov] The information that an agreement to bury radioactive waste from the FRG in the USSR is being prepared does not tally with reality.

We have agreements on scientific and technical cooperation with FRG organizations and firms, and there are contracts for the enrichment of natural uranium obtained from the FRG.

I would like to point out, however, that there is another kind of service that the Soviet Union really does provide. The thing is that nuclear power stations have been and are being constructed in many socialist countries and in Finland with the Soviet Union's assistance within the framework of economic cooperation. The Soviet Union supplies "fresh" nuclear fuel throughout the working life of these nuclear power stations, while spent fuel is taken back to be stored and processed. It is important to emphasize here that the fuel elements contain both uranium and plutonium that can be extracted and used at AES's, as well as certain useful radioactive isotopes that can be utilized in industry, medicine, and so forth. The waste remaining after chemical processing of the fuel and the extraction of useful components is the radioactive waste that has to be buried safely. There are various ways of doing this. One of the promising and adequately tested methods is to place this waste in hard glass that is resistant to any impact from the environment, blocks of which are then buried deep underground in stable, impermeable rock—in granite, for example.

[LITERATURNAYA GAZETA] Do you believe that fuel processing is a more acceptable variant from the ecological viewpoint too?

[Semenov] The majority of developed countries in the nuclear sphere have the technology for chemical fuel processing and for handling radioactive waste. These

countries include France, Britain, the United States, Japan, and the FRG.

From the ecological viewpoint, both methods make it possible to ensure the necessary reliability and safety.

[LITERATURNAYA GAZETA] Where on USSR territory is processed nuclear waste buried?

[Semenov] If you mean nuclear fuel or waste from its processing, the situation now is as follows:

We have the technology for processing radioactive waste, but we have not yet embarked on the broad industrial processing of nuclear fuel. Therefore, as in the majority of other countries that are developing nuclear power, we keep spent fuel in storage pits at AES or in storage pits elsewhere, where this fuel "ages" and its radioactivity drops considerably. As processing capacities are commissioned, nuclear fuel will also be kept at plants, where it is processed, while the waste will be converted into compact stable forms and then buried.

[LITERATURNAYA GAZETA] Do you know anything about cases of a particular country's territory being made available to other countries for the burial of nuclear waste?

[Semenov] As I have already said, France processes and stores radioactive waste (although it can also return it to the customer). It is also known that China has declared its readiness to bury other countries' radioactive waste on its territory and has conducted talks about this.

[LITERATURNAYA GAZETA] Under conditions of the increasingly acute ecological problem and a number of major accidents at nuclear power stations, certain countries are curtailing their nuclear power development programs....

[Semenov] This may come as a surprise to your readers, but nuclear power is one of the ecologically cleanest energy sources. Therefore, to ensure the normal working of AES's, all the efforts of specialists are now aimed at significantly raising the safety level of AES's and developing a new generation of reactors.

From the editors: Today's feature reflects the opinion of a senior Gosatom official. We hope that other specialists will express their viewpoints on this serious ecological problem.

FEDERAL REPUBLIC OF GERMANY

Illegal Export of Nuclear Equipment Facilities
AU2212104588 Cologne Deutschlandfunk Network
in German 0605 GMT 22 Dec 88

[From the program "Press Review"]

[Text] The FRG press today comments on the suspected illegal export of nuclear facilities by a Hessian firm to Pakistan, India, and South Africa. FRANKFURTER ALLGEMEINE states: "it would be bad news if the suspicion proved to be true. A German enterprise is suspected of having supplied technical equipment to Pakistan that could be used to develop and produce nuclear weapons. This country, however, has adopted international law regulations that ban the production of nuclear weapons. The FRG was not allowed to supply the required technology because this is prohibited under the foreign trade law. The relevant export list contains all nuclear equipment for the export of which an official permit is required. In this case, suspicion has hardened that applications for export permits have not been presented, and that the documents accompanying the delivery were not correct."

KOELNER STADTANZEIGER writes: "The government is apparently aware of the significance of the new nuclear scandal. For this reason, it has immediately established a working group with experts from four ministries, who are to elucidate the events surrounding the illegal supply of parts of nuclear facilities. Two managers have already admitted wrongdoing to the public prosecutor. Exactly a year ago, the Trans-Nuklear company from Hanau was in the headlines on suspicion of having violated the Nuclear Nonproliferation Treaty. In the case of the Trans-Nuklear company, the suspicion has not been confirmed. The reputation of the FRG is now once more at stake."

FRANKFURTER RUNDSCHAU points out: "Following the embarrassing drama surrounding the failure at the Biblis nuclear power plant, we are now also facing illegal exports. What else must happen before the government camps in Bonn and Wiesbaden start to reconsider their energy policies? During the past few days we have witnessed how bits and pieces came to light, how the Hessian control organs slowly detected the truth about Biblis. Now it has been revealed—thanks to a very courageous public prosecutor—that for many years nuclear equipment has been transported to countries that are widely known not to speculate only on a peaceful use. This is the second proof now of how uncontrollable the nuclear industry is in objective terms—all the more so in a country like the FRG that does not want to be or become a police state as far as nuclear control is concerned."

BRAUNSCHWEIGER ZEITUNG stresses: "The possible receivers of illegally supplied nuclear equipment and raw materials are not any countries but hotbeds of tension that strive for nuclear weapons. India and Pakistan have long

been hostile toward each other. It would be a shock if material supplied by Germany were used one day by the two states to wage a nuclear war on each other. The German nuclear industry, whose reputation has already been damaged by unforeseen incidents, is taking a high political risk. If the view should prevail that this field should not be left to economy alone, the call for more direct control and ultimately for the nationalization of this branch of industry will be the logical consequence."

STUTTGARTER ZEITUNG comes to the following conclusion: "Many questions are still open. However, if the allegations levelled by the public prosecutor in Hanau turn out to be correct—partial admissions of two persons involved point in this direction—not only has the foreign trade law been violated, but the suspicion, which has repeatedly been raised and rejected again, also hardens that the Germans have indeed helped the Pakistanis to build the nuclear bomb, even if the other parts that have been supplied were used for nuclear power stations. As far as tritium is concerned, there is no other sensible way of using it than for building a nuclear bomb, according to experts. If this is the case, the consequences for the entire government are disastrous, and the damage to international confidence can hardly be repaired."

Confessions of Illegal Export of Nuclear Facilities
AU2712145988 Hamburg WELT AM SONNTAG
in German 25 Dec 88 pp 1-2

[Heinz Vielan report: "First Confessions—Pakistan's A-Bomb With German Help?"]

[Text] Bonn—According to findings of the security organs, two Hessian companies have illegally exported machines and materials to Pakistan that are suited for the manufacture of nuclear bombs.

According to information received by WELT AM SONNTAG, the defendants have already made their first confessions at the Hanau public prosecutor's office, which is investigating the case.

According to these reports, the Pakistani ambassador to the FRG and the "Technic and Scientific Section" of the Pakistani Embassy in Paris were involved in the German export of nuclear facilities.

Investigations carried out by the public prosecutor's office have so far revealed that employees of the companies Neue Technologien GmbH (NTG) [New Technologies] in Gelnhausen-Hailer and Physikalische-Technische Beratung (PTB) [Physical Technical Counseling] in Ortenberg in Hesse supplied, among other things, a complete tritium isolation and enrichment plant with additional laboratory equipment to Pakistan in 1987. They also supplied, according to investigations by the public prosecutor's office, 3,000 curies of tritium (super-heavy water) with a purity of 95 percent.

According to information received by WELT AM SONNTAG, two of the accused company members have already conceded during the interrogations that they had the suspicion that the Pakistani buyer might want to use the facility and the extremely pure tritium that had been supplied to develop even a hydrogen bomb.

According to the current state of the investigation, the plant was delivered by the German companies under the designation "waste-handling system." A nuclear physicist who works for NTG and who had been employed by a scientific institution in Darmstadt until 1987 carried out the "test run" of the plant in Pakistan. As he stated, he realized that the plant was suitable for producing bombs.

A long-time member of the Max-Planck Institute for Plasma Physics, who is a specialist in the field of tritium, is also believed to have been involved in the installation of the tritium enrichment plant in Pakistan and in the procurement of tritium gas.

According to the current state of investigations, in addition to the first delivery of tritium, NTG agreed on the supply of another 300 liters of 95-percent tritium in several phases. Part of the tritium was procured in Switzerland.

Investigations also revealed that the accused NTG nuclear physicist, who worked for a scientific institute in Darmstadt until 1987, admitted that he received about DM1.5 million for his services. He claimed that he took only DM 500,000 for himself. DM 1 million has allegedly been passed on to Pakistani contract partners as bribes.

On the order of the public prosecutor, all company offices and the apartments of the executives involved in the nuclear scandal were searched on 28 and 29 November. During the search, a large volume of evidence was confiscated. In view of the burden of evidence, some of the employees who were involved in the deals with Pakistan have already made partial confessions. Investigations are being carried out against a total of nine persons because of violations of the foreign trade law.

According to the current state of the investigation, the accused German companies also carried out the following deliveries to Pakistan in connection with the nuclear deal:

- two vacuum furnaces for melting natural uranium in 1987;
- a rod-straightening machine and a pelleting machine for the production of uranium pellets in 1987;
- an electronic welding plant for the production of zircaloy rods in the same year;
- about 40 transport and container tanks for uranium hexafluoride, procured in the Netherlands, between 1983 and 1986.

A final supply of jacket tubes for a reactor has allegedly been carried out this year.

The total value of the deliveries in connection with the nuclear deal with Pakistan has been estimated at DM 20 million.

The public prosecutor's office has also been carrying out investigations against the Gutekunst Co. in Villingen/Schwenningen (Baden-Wuerttemberg). The company was searched on 14 December. The Gutekunst Co. is believed to have been involved in the procurement of tritium gas for Pakistan.

Agreement Signed With PRC on Nuclear Technology

LD2712154888 Hamburg DPA in German
1454 GMT 27 Dec 88

[Excerpt] Bergisch-Gladbach (DPA)—An agreement on a German-Chinese program for high-temperature reactor technology has been signed by the Institute for Nuclear Technology (INET) of the Qinghua University, Beijing; the Siemens subsidiary company Interatom of Bergisch-Gladbach; and the nuclear research plant at Juelich. The main points of the cooperation are the planning and construction of a high-temperature reactor module as a test reactor at INET. Interatom announced in Bergisch-Gladbach today. [passage omitted]

Stricter Export Controls Planned

AU2812105888 Hamburg DIE WELT in German
28 Dec 88 p 1

["UR" report: "Bonn Wants To Introduce Export Controls for Companies Producing Nuclear Equipment"]

[Text] Bonn—The delivery of a German nuclear plant to Pakistan by means of which hydrogen bombs can apparently be produced has provided fresh impetus to the discussion within the coalition about nuclear controls. Part of the coalition questions the FRG's liberal foreign trade practices. Fears are growing that deliveries of that kind violate the Nuclear Nonproliferation Treaty.

In any case, foreign policy has been harmed by the delivery of the tritium isolation and enrichment plant to Pakistan, FDP Deputy Chairman Baum pointed out. It is true that the investigations carried out by the public prosecutor's office have not been concluded, but "everything points to an infringement of the Nonproliferation Treaty," he told DIE WELT. Similar assumptions have been expressed by the SPD. The Economics Ministry, however, which is led by an FDP minister, does not share this view: "The Nuclear Nonproliferation Treaty is an agreement that has been concluded between governments; government members are not involved in the case," the ministry stated.

Views on stricter controls differ widely within the coalition. The Economics Ministry does not want to restrict the

current liberal foreign trade practices, according to which everything is allowed that is not prohibited. However, steps are to be considered that provide for stricter controls in the companies, tighter customs controls, and for ensuring more personnel for the Economic Control Office in Eschborn. Because of the fact that a large proportion of medium-sized and partly highly specialized subcontractor firms would be affected, there would be little room for controls, Hausmann's ministry stressed.

On the other hand, Baum called for the "introduction of banning regulations with the reservation of permission, which means that all exports of this kind are banned unless they have been permitted." This practice is also applied in the United States. Baum is in favor of intensifying controls at the borders. In connection with the discussion about the EC single market, he also suggested that the government "must take measures that ensure that controls are not undermined."

In addition to that, Baum advocates splitting up the spheres of responsibility within the government. Concerning the Nonproliferation Treaty, responsibilities must be "reorganized," Baum spoke of a "necessary concentration, possibly in Toepfer's Environment Ministry." Without giving more details, the CDU has suggested that the "government make proposals for the reorganization of responsibilities regarding the import and export of nuclear materials." In specific terms, Baum calls for the "involvement of the Radiation Protection Office in foreign trade permit procedures." It is "questionable whether it is correct that the Economic Control Office in Eschborn (it ensures the observance of the foreign trade law) alone should decide about the admissibility of exports." The Eschborn office probably supports only the interests of foreign trade, Baum criticizes.

By involving the Radiation Protection Office, the government's competence in controlling the export of nuclear material must also be increased. The SPD proposal to install independent security controllers has been dismissed by Baum. In connection with the discussion about coming to terms with the Transnuclear affair, the concept of increased responsibility on the part of the government was rejected by the laender.

In connection with the export affair, Pakistan's ambassador to Bonn, Masud [spelling as published], has been summoned to the Foreign Ministry.

SPD Demands Halt to Nuclear Exports

AU2912140788 Hamburg DIE WELT in German
29 Dec 88 p 8

[Report by Ulrich Reitz: "Now Bonn Wants To Draw Conclusions From the Nuclear Exports; After Deal With Pakistan, SPD Demands Export Stop"]

[Text] Bonn—Economics Minister Helmut Haussmann will present an interim report on the improvement of

foreign trade controls to the cabinet on 10 January. The Federal Government wants to draw conclusions from the delivery of parts for plants that are obviously suitable for the production of nuclear bombs from the FRG to Pakistan. This was disclosed after a confidential meeting of the department heads of the ministries for economy, environment, the interior, and health, and the Federal Chancellor's Office. On 20 December the cabinet ordered the meeting to be held.

The delivered tritium isolation and enrichment plant serves to produce extremely pure tritium, a property that is used in many ways, including in the production of nuclear bombs. So far, Pakistan has officially denied that it possesses the "bomb." Masood, Pakistani ambassador to Bonn, who has represented his country in the FRG only since March 1988 and, therefore, is not personally involved in the affair, promised Bonn that Pakistan will participate in clearing up the situation. In a talk with Sudhoff, state secretary in the Foreign Ministry, he also showed an understanding for the German concerns, and he wants to request information on the events from the Pakistani Government. Masood's predecessor, from January 1985 to March this year, was Abdul Waheed.

On behalf of the SPD, Harald B. Schaefer, SPD environmental policy spokesman, called the Federal Government to task. It is true that a "formal violation" of the Nonproliferation Treaty has not been ascertained thus far because "individual firms cannot formally violate the treaty," Schaefer, who is also deputy chairman of the SPD Bundestag Group, stated to DIE WELT. But, "according to the predominant interpretation of international law, the FRG is not protected (against this reproach) by its ignorance of the export deals, if it is responsible for this ignorance," Schaefer said. At any rate, if the "suspicion" that the Nonproliferation Treaty was violated was confirmed, this would mean for the FRG a "loss of international prestige and credibility because the Federal Government is not able to guarantee the fulfillment of its commitments to international law."

The Economic Control Office is "hopelessly understaffed," Schaefer said. There, only one senior executive officer deals with export permits. "The lack of personnel and means is almost an invitation not to register exports that are subject to authorization" and, thus, to bypass the foreign trade law. This constitutes a "great weakness." The SPD politician also complained about the fact that the border controls by customs officials are "largely" restricted to freight documents.

He called on the Federal Government "not to deliver technologies and materials suitable for nuclear weapons to countries that have not signed the Nonproliferation Treaty." This has nothing to do with a "boycott," Schaefer said, because it need not be authorized by experts. At any rate, this is "a minimum demand to which everybody ought to consent," Schaefer warned, alluding to the Economic Ministry, which is concerned about liberal foreign trade. "The Economic Ministry

must not continue to be generally responsible for export permits. In the past it turned out to be a promoter of nuclear energy," at the expense of controls. In this context, Schaefer stated that a "nuclear law amendment" is "overdue." The state still has the task to promote nuclear energy, but it should restrict itself to its control tasks, Schaefer said, in view of the interest of the "nuclear community" of politicians, enterprises, and authorizing and control authorities in promoting nuclear energy. However, the state must not become an "accomplice in promoting nuclear energy."

According to Schaefer, it would be "best" to stop nuclear exports and to abandon nuclear energy. The events in connection with Pakistan have shown once again that "the differentiation between civilian and military use of nuclear power is fictitious."

IRELAND

Meeting Told of Problems in Nuclear Waste Disposal

51500039 Dublin IRISH INDEPENDENT in English
22 Oct p 5

[Article: "Nuclear Waste Pile-Up Safety Threat: Expert"]

[Text] Ireland has "significant" problems in dealing with the use and disposal of unsealed radioactive sources, a major conference on industrial safety was told yesterday.

No national waste collection or disposal system exists to handle the accumulation of long-lived radioactive wastes produced by hospitals and university research laboratories, Dr Michael McKillen, of TCD's Biochemistry Department, told the National Industrial Safety Organisation conference in Kilkenny.

An EC Directive laying down basic safety standards still has not been incorporated in Irish legislation, he added.

Managements here have been "dilatatory" in issuing local codes of practice to govern health and safety aspects of work with ionising radiation, claimed Dr McKillen.

In many cases, managements were not giving dosage level data to exposed workers, he said.

The Nuclear Energy Board (NEB) has refused to establish a national waste system like that in the North. It should assume the role of a training agency, so a uniform standard of instruction could be achieved, said Dr McKillen.

Dr McKillen added: "It would be more helpful to Irish workers if the Minister could devote less attention to Sellafield and concentrate on the problems associated with the use of radionuclides."

Dr Noel Nowlan, of the NEB, claimed the EC Directive's standards were laid down in licensing controls here, even if they were not yet in legislation. But the matter of long term storage was a Government matter, he added.

SWEDEN

Majority Favoring Nuclear Energy Unchanged

51002414 Stockholm DAGENS NYHETER in Swedish
14 Dec 88 p 13

[Text] An unchanged 56 percent of poll respondents believe that it was good that Sweden utilized nuclear power. Thirty percent believe that this was a poor decision. These figures are from the latest in a series of polls (nat SIFO [Swedish Opinion Institute] conducted for the nuclear power industry. A clear majority, 71 percent, is optimistic that the Swedish reactors will be able to be operated without accidents. Twenty-nine percent of the respondents believe that use of nuclear power should be ended as soon as possible, though at the latest by the year 2010. Twenty-six percent said they think that phasing out should be commenced in about 1995 and should be completely eliminated by 2010, while 40 percent assert that Swedish nuclear energy should be utilized even after 2010.

UNITED KINGDOM

Correspondent on Future of Nuclear Energy

51500036 London THE DAILY TELEGRAPH in English
1 Nov 88 p 7

[Article by Philip Johnston]

[Text] The bulk of Britain's energy needs is likely to be met for the foreseeable future by the burning of fossil fuels, despite Government hopes of a huge expansion of nuclear power generation to curb atmospheric pollution.

The Energy Department has received applications from the Central Electricity Generating Board for only four pressurised water reactors.

One, at Sizewell in Suffolk, has received planning permission, an inquiry is under way into a second at Hinkley Point, Somerset, and two others are pending.

Although the Bill to privatise the industry, due to be published early in the next Parliamentary session, will give nuclear power a guaranteed 20 per cent of the market, future decisions on nuclear generation will rest solely with private managers and investors.

Whitehall sources last night insisted there was no "hidden agenda" for a massive increase in nuclear power, despite weekend comments by Mr Ridley, the Environment Secretary, that such an expansion was the best strategy for averting the greenhouse effect on the earth's atmosphere.

Mrs Thatcher has also spoken of the need for a significant extension of nuclear energy, which would reduce the volume of harmful gases responsible for atmospheric pollution.

In a written Commons reply last night, she defended her Government's record in dealing with the effects of pollution from coal-fired power stations.

She said Britain had initiated "the second largest programme in Europe to combat the polluting emissions which contribute to acid rain"—including spending 1 billion pounds over 10 years.

In addition, there would be "substantial further expenditure" to cut by the turn of the century emissions of sulphur dioxide from power plants by 60 per cent, and of nitrous oxide by 30 per cent.

Mrs Thatcher said the Government was also pressing for an 85 per cent cut in the consumption of chlorofluorocarbons, which damage the ozone layer.

She added: "On the North Sea, we are implementing the major package of measures agreed by the Second International Conference which was held last November, which include a reduction in discharges of dangerous substances to rivers by 50 per cent by 1995; an end to dumping of oB = hazardous industrial waste into the North Sea by the end of 1989, and an end to marine incineration by the end of 1994."

UK Seeks To Replace Military Nuclear Reactors
51500034 London THE DAILY TELEGRAPH in
English 9 Nov 88 p 8

[Article by Roger Highfield, Technology Editor: "Plant Closures Could Hit Atomic Weapons Supply"]

[Text] Plans to replace two military nuclear stations which make plutonium were announced yesterday by British Nuclear Fuels. However, the company made it clear that if a competitive method of plutonium generation could not be found, Britain may in future rely on other countries, such as France or the United States, for the plutonium for its nuclear deterrent.

Presenting its annual report, British Nuclear Fuels said it was about to launch a study on how to replace its eight ageing nuclear reactors at Calder Hall in Cumbria, and Chapelcross, Dumfriesshire.

The former generates steam for nearby plant in Sellafield, and both generate electricity and produce plutonium for military use.

The four reactors at each station generated their first power between 1956 and 1959 in the case of Calder Hall, and 1959 and 1960 for Chapelcross, making them the country's oldest operating nuclear power reactors.

The Ministry of Defence relies on plutonium made in the reactors for weapon manufacture and a large proportion of the company's 10 per cent business with the Defence Ministry is associated with weapons work.

British Nuclear Fuels will say when the plants would be shut down and the ministry will be consulted on their replacements.

However, under the terms of a new agreement, electricity from Chapelcross is being used to supply consumers in north west England in line with a company target to maintain Calder and Chapelcross for at least 10 years.

Yesterday, the company outlined its strategy for dismantling the plants, which is similar to that used by the Central Electricity Generating Board.

Overall, the process will not take longer than 100 years, but Mr Neville Chamberlain, chief executive, declined to give the cost of the operation.

To study how the plants should be replaced, British Nuclear Fuels has set up a team which is preparing a proposal for a feasibility study next year.

Mr Christopher Harding, chairman, also said that the option remained open on whether a new nuclear plant would generate plutonium for oB = nuclear weapons manufacture.

Transport Union Set To Blacklist Nuclear Cargo
51500032 London THE SUNDAY TELEGRAPH
in English 20 Nov 88 p 5

[Article by Toby Helm]

[Text] The Transport and General Workers' Union looks ready to order its members to black all imports of radioactive substances through British ports amid growing concern about the dangers of handling hazardous cargoes.

The union's national secretary for docks and waterways, Mr John Connolly, told THE SUNDAY TELEGRAPH that he fully expected the TGWU executive to move swiftly towards an embargo of all nuclear imports.

"We are already actively campaigning for an embargo on importing toxic waste for dumping, and I would have thought that a ban on importing radioactive materials would tie in with this," he said.

"There is definitely mounting concern about the dangers of handling such cargoes, I am sure there will be implications for union policy and that the matter will be discussed at future executive meetings."

Concern among TGWU members and the public had risen greatly since the vessel, Karin B, tried to off-load highly-toxic Italian waste in a British port during August,

Mr Connolly said. "There is not much difference between banning that sort of import and banning dangerous radioactive imports."

The Karin B was ordered away from British waters by the Government on September 1.

Any embargo by the TGWU, Britain's largest union, on imports of spent nuclear fuel and radioactive materials would deepen transport problems for British Nuclear Fuels.

Last week, the company admitted "some problems" in finding shipping operators and ports willing to handle potentially hazardous cargoes vital to the nuclear cycle after the Swedish-owned company, Exxtor, decided to stop all imports of spent nuclear fuel and enriched (radioactive) hexafluoride through Immingham, South Humberside.

Exxtor, previously BNFL's principal east-coast handler of such cargoes, said rising insurance costs had made the business uneconomic. In addition, the company was responding to "growing concern" about imports of radioactive and toxic materials, and felt no longer able to guarantee a regular service.

A BNFL official said: "Obviously we are concerned if a company such as Exxtor pulls out. We are aware that there are a number of vociferous groups campaigning on the issue, but although we may have some problems we are confident we will find methods of getting necessary materials to O.B. - our plants.

"We are now making additional efforts to convince the public that these substances are safe to transport. We do not anticipate our processes being affected."

During the summer TGWU dockers at Goole, on the Ouse, refused to handle a radioactive cargo bound for BNFL, making clear they would move no nuclear substances in future. Other ports refusing to handle certain radioactive BNFL cargoes include Folkestone and Liverpool.

Meanwhile, environmentalists and anti-nuclear campaigners view the Exxtor decision, and any possible TGWU ban, as major breakthroughs.

A Greenpeace campaigner, Mr Philip Cade, said: "I am delighted that people are beginning to realise the dangers. If there were an accident in one of our ports, there could be a disaster on the scale of Chernobyl.

"Certainly the publicity over the recent Karin B episode has heightened public concern over the huge amount of hazardous substances coming across the North Sea.

"I am sure that British Nuclear Fuels must be very worried indeed at the difficulties they are having because their whole process depends on these substances."

A spokesman for the Campaign for Nuclear Disarmament on Humberside said "Any reduction in the volume of such traffic through our ports is to be welcomed, but we see these developments as just one stage in the move towards a nuclear-free Humber."

Regular loads of low-radioactivity hexafluoride will continue to be transported from BNFL's Springfield works, near Preston, to Immingham and then shipped to Holland. There, the radioactivity is "enriched," allowing the hexafluoride on its return to be used to make fuel rods or elements for civil or military reactors.

It is these cargoes of enriched material, together with spent nuclear fuels bound for Sellafield reprocessing plant in Cumbria, which will no longer be re-imported through Immingham.

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